

# 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 on 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 Microchip™ Windows Developer Kit from Microchip (<http://www.microchip.com/dk>).

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## Contents

1	Introduction	2
2	Direction Cosine Matrix Algorithm	3
3	MSP430F5xx AHRS Firmware Overview	4
4	Sensor Calibration	7
5	Conclusion	9
6	Disclaimer	11
7	References	12

## List of Figures

1	AHRS Circuit Overview	2
2	Local Vector Matrix Algorithm Overview	4
3	MSP430F5xx AHRS Firmware Overview	5
4	AHRS IIR	9
5	MSP430F5xx Calibration Firmware Overview	9
6	AHRS Calibration IIR	7
7	Magnetometer Hard Iron Calibration	9
8	Procedure for Hard Iron Calibration of the Magnetometer	9
9	MSP430F5xx Voltage Measurement	10

## List of Tables

1	Sensor Data Request Commands	6
2	System Status CommandSet	10

# Nine Axis Sensor Fusion Using Direction Cosine Matrix

**DP Hallahan**



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## **Table of Contents Nine Axis Sensor Fusion Using Direction Cosine Matrix**

1. Understanding the eBook Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - The Rise of Digital Reading Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Advantages of eBooks Over Traditional Books
2. Identifying Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in a Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - User-Friendly Interface
4. Exploring eBook Recommendations from Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Personalized Recommendations
  - Nine Axis Sensor Fusion Using Direction Cosine Matrix User Reviews and Ratings
  - Nine Axis Sensor Fusion Using Direction Cosine Matrix and Bestseller Lists
5. Accessing Nine Axis Sensor Fusion Using Direction Cosine Matrix Free and Paid eBooks
  - Nine Axis Sensor Fusion Using Direction Cosine Matrix Public Domain eBooks
  - Nine Axis Sensor Fusion Using Direction Cosine Matrix eBook Subscription Services

- Nine Axis Sensor Fusion Using Direction Cosine Matrix Budget-Friendly Options
- 6. Navigating Nine Axis Sensor Fusion Using Direction Cosine Matrix eBook Formats
  - ePub, PDF, MOBI, and More
  - Nine Axis Sensor Fusion Using Direction Cosine Matrix Compatibility with Devices
  - Nine Axis Sensor Fusion Using Direction Cosine Matrix Enhanced eBook Features
- 7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Highlighting and Note-Taking Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Interactive Elements Nine Axis Sensor Fusion Using Direction Cosine Matrix
- 8. Staying Engaged with Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Nine Axis Sensor Fusion Using Direction Cosine Matrix
- 9. Balancing eBooks and Physical Books Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Benefits of a Digital Library
  - Creating a Diverse Reading Collection Nine Axis Sensor Fusion Using Direction Cosine Matrix
- 10. Overcoming Reading Challenges
  - Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
- 11. Cultivating a Reading Routine Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Setting Reading Goals Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Fact-Checking eBook Content of Nine Axis Sensor Fusion Using Direction Cosine Matrix
  - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
  - Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
- 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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