Decision Table

Columns:

1. **Accelerometer Data**: X, Y, Z values from the accelerometer.
2. **Magnetometer Data**: X, Y, Z values from the magnetometer.

Rows:

The rows represent different possible outcomes and actions taken by the program:

1. **Kalman Filter Application:** Verify if the Kalman filter is applied correctly to the sensor data.
2. **Coordinate Calculation:** Check if the coordinates are calculated correctly based on filtered sensor data.
3. **Heading Calculation**: Assess if the heading is calculated correctly from the magnetometer data.

Decision Table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Accelerometer Data** | **Magnetometer Data** | **Kalman Filter** | **Coordinate Calculation** | **Heading Calculation** |
| Valid Readings | Valid Readings | Applied | Correct | Correct |
| Noisy Readings | Valid Readings | Applied | Correct | Correct |
| Valid Readings | Noisy Readings | Applied | Correct | Correct |
| Noisy Readings | Noisy Readings | Applied | Correct | Correct |

Test case:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test Case ID | Description | Preconditions | Test Steps | Expected Results | Actual Results | Pass/Fail |
| TC01 | Validate functionality with valid accelerometer and magnetometer data. | I2C and sensors initialized. | 1. Provide valid accelerometer data (ax, ay, az). 2. Provide valid magnetometer data (mx, my, mz). 3. Observe the output. | Kalman filter applied correctly. Coordinates and heading calculated accurately. | The code functions as expected | Pass |
| TC02 | Test with noisy accelerometer data and valid magnetometer data. | I2C and sensors initialized. | 1. Provide noisy accelerometer data. 2. Provide valid magnetometer data. 3. Observe the output. | Kalman filter mitigates noise. Accurate coordinates and heading calculated. | The code functions as expected | Pass |
| TC03 | Test with valid accelerometer data and noisy magnetometer data. | I2C and sensors initialized. | 1. Provide valid accelerometer data. 2. Provide noisy magnetometer data. 3. Observe the output. | Kalman filter mitigates noise. Accurate coordinates and heading calculated. | The code functions as expected. | Pass |
| TC04 | Validate functionality with noisy data from both sensors. | I2C and sensors initialized. | 1. Provide noisy accelerometer data. 2. Provide noisy magnetometer data. 3. Observe the output. | Kalman filter effectively reduces noise. Coordinates and heading calculated with reasonable accuracy. | The code functions as expected | Pass |