Freescale MQX Example Guide
eCompass example

This document describes the eCompass example application. It shows how to demonstrate freescale's eCompass application.

Running the example

Start a terminal application on your PC and set the serial connection for 115200 baud, 8 data bits, 1 stop bit, no parity and no flow control.

Start the eCompass example on the target platform. For instructions about how to do that in different IDEs and for different debuggers, see the MQX documentation (<MQX installation folder>/doc/tools).

After starting the application, you will see the printed message as the following:

```
2 entries in magnetometer buffer is too few for calibration
Iteration:    271
f6DOF: Gpx    -46  -0.01 Gpy     22   0.01 Gpz   2060   0.50
f6DOF: Bpx   1431 143.10 Bpy  -1090 -109.00 Bpz   -571 -57.10
f6DOFECOM: Phi    0.61 The    1.28 Psi   37.40 Rho   37.40 Delta  -19.00
f6DOFLP  : Phi    0.61 The    1.28 Psi   37.40 Rho   37.40 Delta  -19.00
2 entries in magnetometer buffer is too few for calibration
Iteration:    272
f6DOF: Gpx    -48  -0.01 Gpy     31   0.01 Gpz   2057   0.50
f6DOF: Bpx   1431 143.10 Bpy  -1090 -109.00 Bpz   -571 -57.10
f6DOFECOM: Phi    0.86 The    1.34 Psi   37.35 Rho   37.35 Delta  -19.20
f6DOFLP  : Phi    0.86 The    1.34 Psi   37.35 Rho   37.35 Delta  -19.20
2 entries in magnetometer buffer is too few for calibration
Iteration:    273
f6DOF: Gpx    -41  -0.01 Gpy     24   0.01 Gpz   2065   0.50
f6DOF: Bpx   1431 143.10 Bpy  -1090 -109.00 Bpz   -571 -57.10
f6DOFECOM: Phi    0.67 The    1.14 Psi   37.36 Rho   37.36 Delta  -18.92
f6DOFLP  : Phi    0.67 The    1.14 Psi   37.36 Rho   37.36 Delta  -18.92
2 entries in magnetometer buffer is too few for calibration
Iteration:    274
f6DOF: Gpx    -48  -0.01 Gpy     27   0.01 Gpz   2059   0.50
f6DOF: Bpx   1431 143.10 Bpy  -1090 -109.00 Bpz   -571 -57.10
f6DOFECOM: Phi    0.75 The    1.34 Psi   37.38 Rho   37.38 Delta  -19.13
```

Figure1. Example runtime output before calibration

Figure1 shows the eCompass output before it is calibrated, you need to move the 6SX SABRE-SDB board in a figure 8 motion to calibrate the eCompass system. After calibrated(display 24 entries in magnetometer), you will see printed message as below in the terminal:

```
f6DOFECOM: Phi     0.25 The     1.31 Psi   126.70 Rho   126.70 Delta    55.01
f6DOFLP  : Phi     0.25 The     1.31 Psi   126.70 Rho   126.70 Delta    55.01
Iteration:    862
f6DOF: Gpx     -49  -0.01 Gpy      12    0.00 Gpz    2055    0.50
f6DOF: Bpx    1397 139.70 Bpy   -1114 -111.40 Bpz    -568 -56.80
f6DOFECOM: Phi     0.33 The     1.37 Psi   126.56 Rho   126.56 Delta    54.98
f6DOFLP  : Phi     0.33 The     1.37 Psi   126.56 Rho   126.56 Delta    54.98
Iteration:    863
f6DOF: Gpx     -47  -0.01 Gpy      17    0.00 Gpz    2058    0.50
f6DOF: Bpx    1397 139.70 Bpy   -1114 -111.40 Bpz    -568 -56.80
f6DOFECOM: Phi     0.47 The     1.31 Psi   126.51 Rho   126.51 Delta    54.83
f6DOFLP  : Phi     0.47 The     1.31 Psi   126.51 Rho   126.51 Delta    54.83
Iteration:    864
f6DOF: Gpx     -45  -0.01 Gpy      15    0.00 Gpz    2059    0.50
f6DOF: Bpx    1397 139.70 Bpy   -1114 -111.40 Bpz    -568 -56.80
f6DOFECOM: Phi     0.42 The     1.25 Psi   126.63 Rho   126.63 Delta    54.84
f6DOFLP  : Phi     0.42 The     1.25 Psi   126.63 Rho   126.63 Delta    54.84
Iteration:    865
f6DOF: Gpx     -48  -0.01 Gpy      11    0.00 Gpz    2057    0.50
f6DOF: Bpx    1394 139.40 Bpy   -1112 -111.20 Bpz    -572 -57.20
f6DOFECOM: Phi     0.31 The     1.34 Psi   127.08 Rho   127.08 Delta    54.86
f6DOFLP  : Phi     0.31 The     1.34 Psi   127.08 Rho   127.08 Delta    54.86
Iteration:    866
```

Figure2. Example runtime output after calibration

Explanation of the example

The eCompass example application will get real sensor data from MAG3110 and MMA8451Q periodically with one sample every 40ms, the sensor data(Gpx, Gpy, Gpz, Bpx, Bpy, Bpz) will be printed out in the terminal in every iteration, followed with orientation information (Euler angles). The NED(North East Download) coordinate system is selected by default as below.

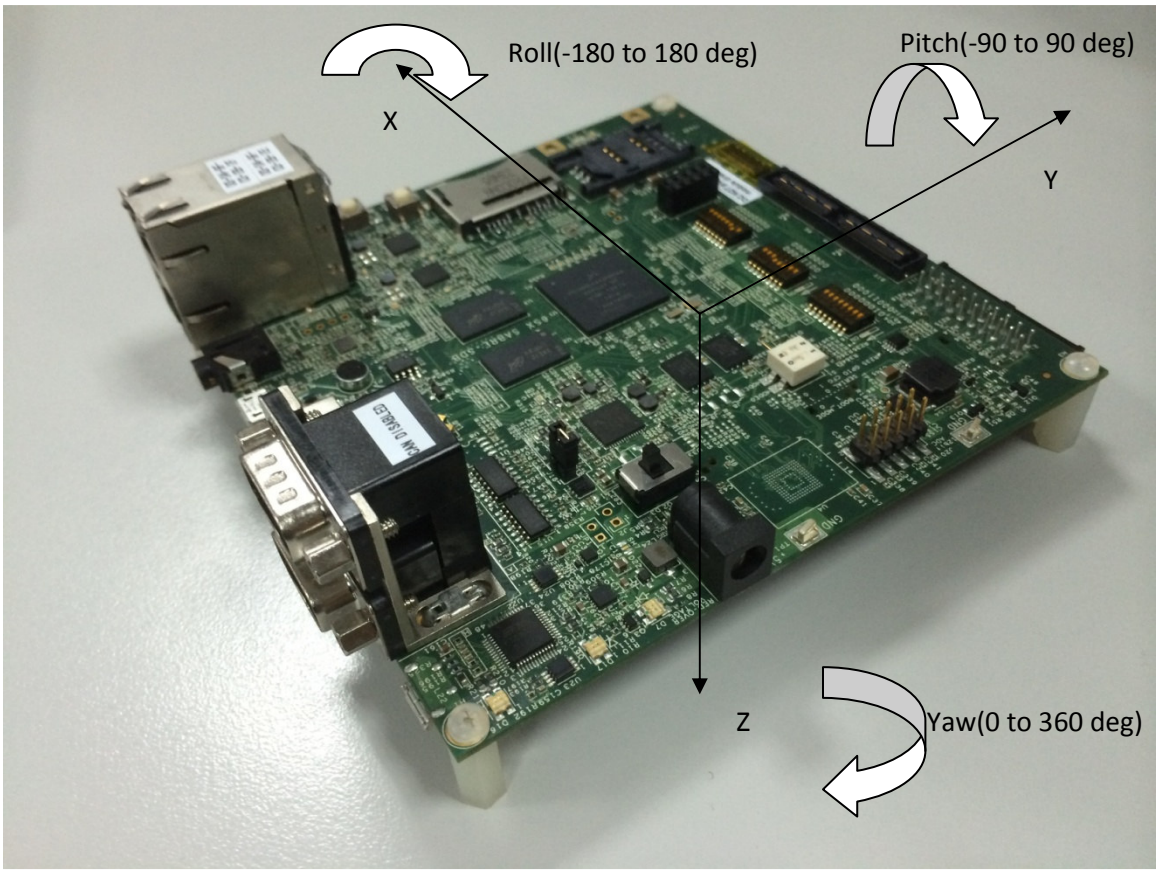

Figure3. NED coordinate system

Place board flat on the desk with x axis pointing to north as above, Phi is roll and its value is from –180 to 180 degree, when you rotate clockwise the board around x axis, roll reading increases from 0 deg. The is pitch and its value is from –90 to 90 degree, when you rotate clockwise the board around y axis, pitch reading increases from 0 deg. Psi is yaw and its value is from 0 to 360 degree, when you rotate clockwise the board around z axis, yaw reading increases from 0 deg. Rho is compass angle whose value is exactly same as Psi in NED coordinate system.