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Introduction

Current measurements of the SENtral and the ST LIS2DH accelerometer were measured separately using custom pedometry firmware. The firmware filenames used were:

LIS2DH_TEST-di02.1.2.192.ODR-25Hz.fw

This customized firmware is for accel-only operation and provides step-count, tilt, and significant motion data. The LIS2DH accelerometer was the only sensor used in conjunction with SENtral.

Executive Summary

Four SENtral Motion Processors were tested and one LIS2DH accelerometer. Average total current consumption for SENtral while running the accel-only pedometry firmware was 20.6 µA, while total current consumption for the LIS2DH accelerometer was 5.3 µA.

Test Description

Tests were performed using a SENtral Development Board and an ST LIS2DH accelerometer on its own daughterboard, where the complete setup is shown in Figure 1. Four (4) SENtral-only GS0 modules were individually tested in E socket on the development board. The LIS2DH was connected to the development board using jumper wires, as shown in Figure 2. Current consumption for SENtral was measured by probing the "VDD SENtral" line, as highlighted in Figure 3. Current consumption for the accelerometer was measured by removing first the analog and next the digital voltage jumpers and inserting the multimeter probes in series with the respective line, as shown for the analog line in Figure 4. Finally, the SENtral DVDD line was tared by removing all components from the development board and the current consumption on the "VDD SENtral" line was again measured, per in Figure 5.

Prior to testing, AVDD on the development board was set to 2.85 V, while VDD was set to 1.80 V.

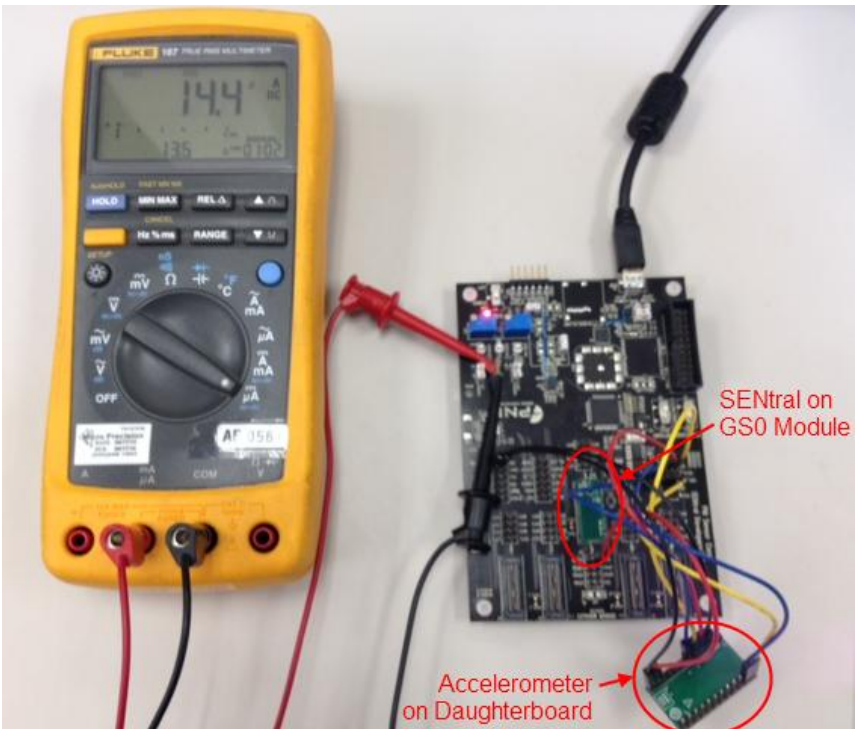

Figure 1 Current Consumption Test Setup

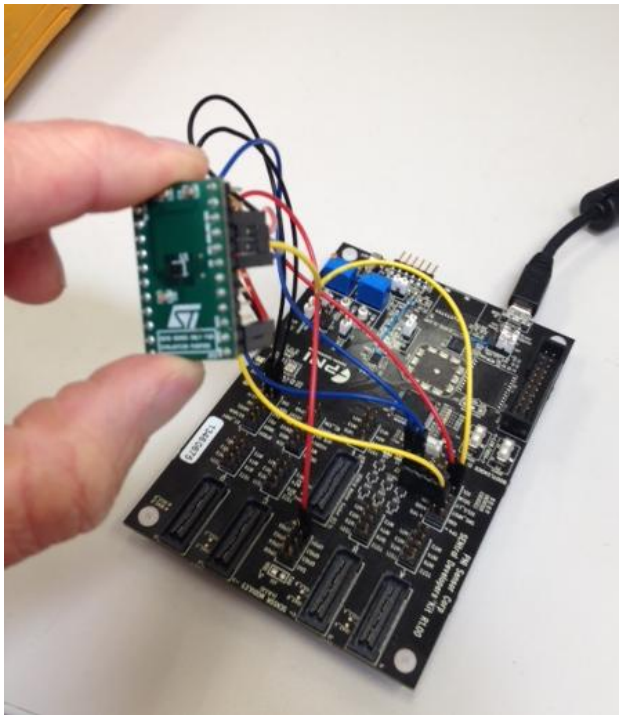

Figure 2 Close up of LIS2DH wiring

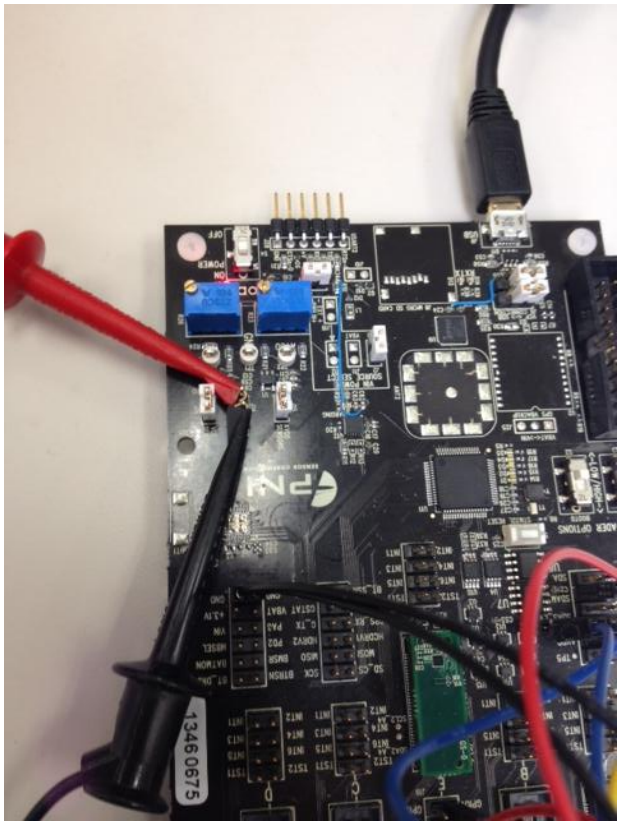

Figure 3 Close up of SENtral Current Measurement

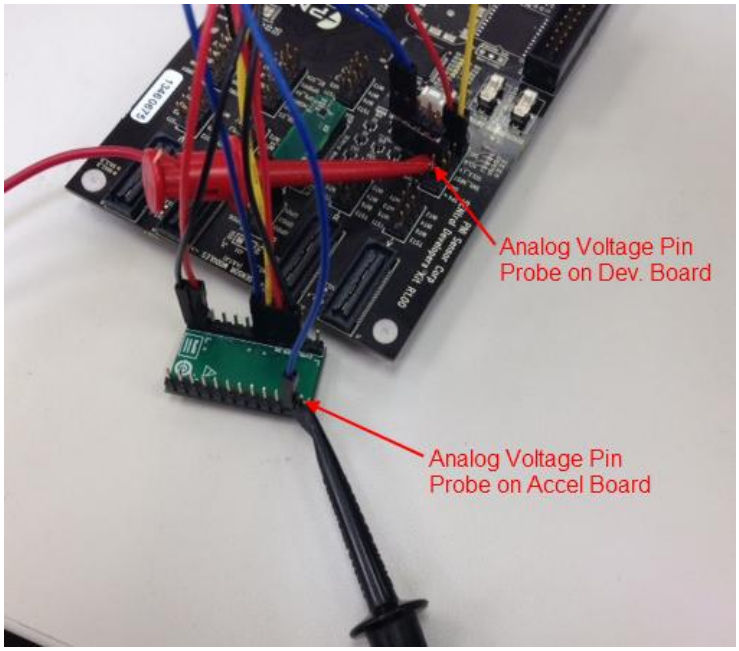

Figure 4 Close up of Accelerometer Analog Current Measurement

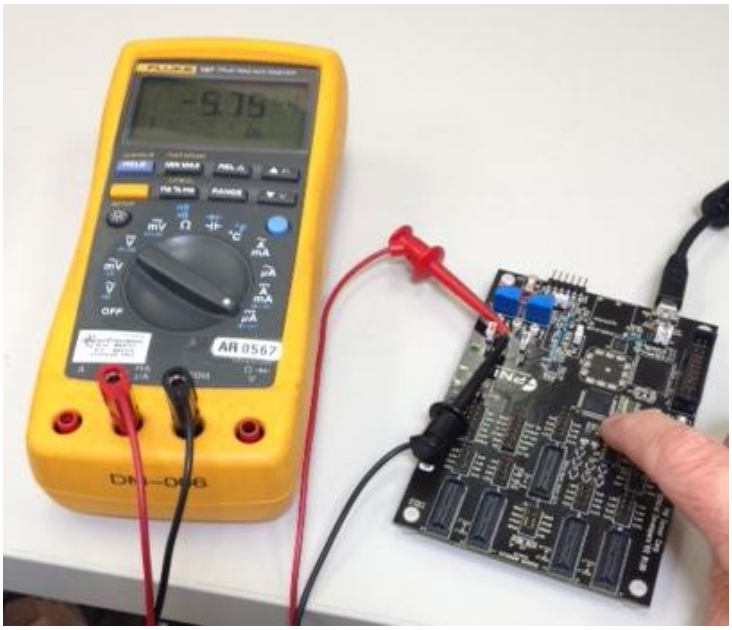

Figure 5 Tare Testing

Confirmation of Operation

Prior to taking measurements, proper functioning of the pedometry algorithm was demonstrated by running the Pedometry Demo program. Figure 6 shows the program while running.

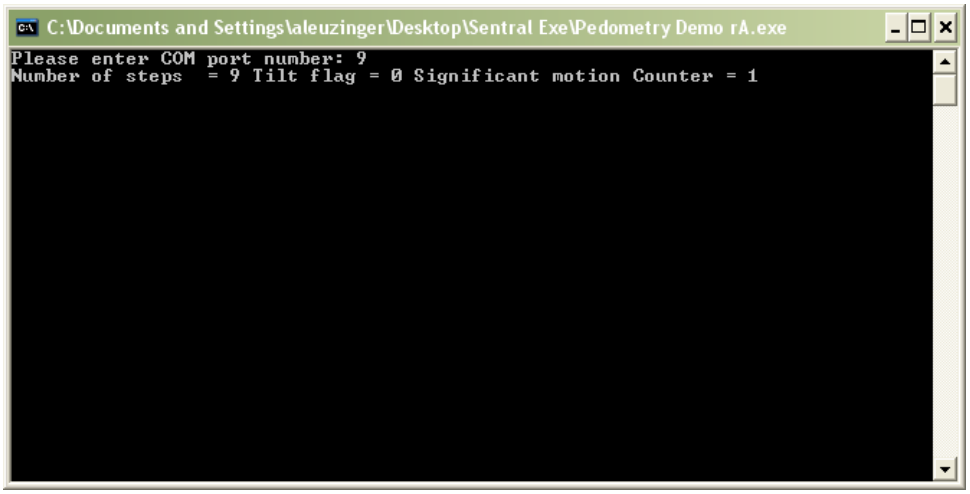

Figure 6 Pedometry Demo Screen Shot.

Measurement Results

TABLE1 SENTRAL GS0 CURRENT CONSUMPTION
(DVDD=1.80V, AVDD=2.85V)

SENtral GS0 Module #	VDD SENtral	Tare	Total Current
7	14.4 µA	-5.8 µA	20.2 µA
11	15.0 µA	-5.8 µA	20.8 µA
13	14.7 µA	-5.8 µA	20.5 µA
14	15.1 µA	-5.8 µA	20.9 µA
Average	**14.8 µA**	**-5.8 µA**	**20.6 µA**

TABLE2 LIS2DH CURRENT CONSUMPTION
(DVDD=1.85V, AVDD=2.85V)

Voltage Line	Current Consumption
AVDD (V_{dd})	4.5 µA
DVDD (V_{dd_IO})	0.8 µA
Total Current	**5.3 µA**

Notes and Observations

Current consumption results for the SENtral were quite consistent, averaging just 20.6 µA. The result for the LIS2DH was a very low 5.3 µA, which is fairly close to spec. (The LIS2DH has an I_{dd} spec of 6 µA when operating at 50 Hz in low power mode.) Note that the LIS2DH current consumption was with the SAO pin set high. When the pin was set to ground the current on the DVDD line was 32.5 µA, as the device has an internal pull-up resistor.