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Quickstart Guide for MEMS Gyroscope FG5 with STM Nucleo-Board + "GyroLive" Software

1 Features

- Readout digital angular velocity sensor (z-axis) via SPI interface
- Standard output rate is 2000 samples per second
- Readout values are angular rate and a 6 bit counter for error detection
- Using STM32 Nucleo-64 boards[1]
- Data is streamed over USB to the readout PC
- Data stream can be read by arbitrary terminal software receiving serial COM-port stream (e.g. HTerm[2], PuTTY[3])
- Adapter shield for STM to Sensor connection includes voltage references for noise free power delivery
- STM board is powered over USB, the sensor needs an extra 9-12 V power supply
- 'GyroLive' software for plotting the data stream

2 Hardware Setup

The adapter shield is installed on the STM-Board as shown in Figure 1. The shield connects the SPI interface as well as the power supply to the sensor. The shield and the sensor PCB are connected by the included cables according to the labels. To power up the system a 9-12 V power supply needs to be connected to the shield. A USB Mini-B cable is needed for data transfer to the PC.
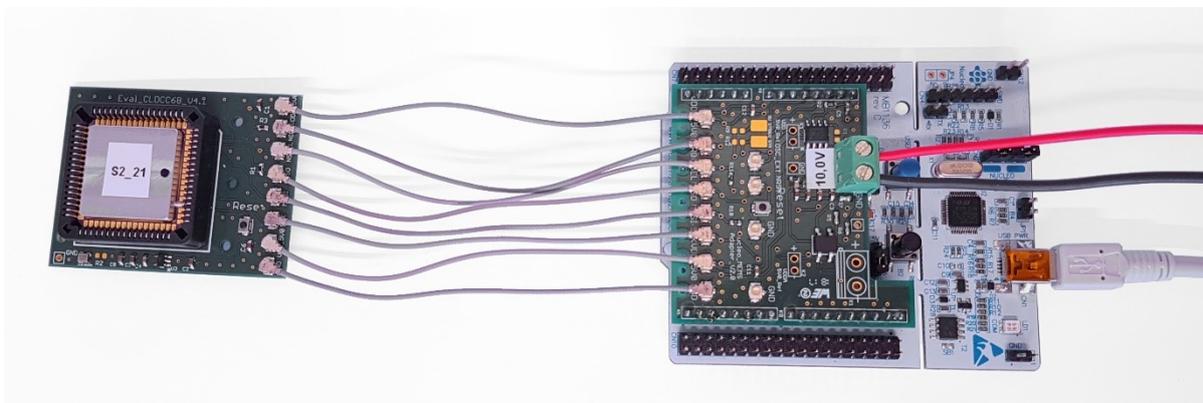
Figure 1: Wiring example

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[1] Overview STM32 Nucleo-64 boards: www.st.com/en/evaluation-tools/stm32-mcu-nucleo.html
[2] Website Terminal Software hTerm: http://www.der-hammer.info/terminal/
[3] Website Terminal Software PuTTY: https://www.putty.org

3 Software Setup

The 'GyroLive' Software runs on Windows 10 64-bit, without installation. If plugged in the first time, the driver for the STM-Board should be installed automatically via windows update. Otherwise download the driver from them manufacturers Website[4] and install it as described. The board should show up as a drive with name 'NODE_L073RZ' in the explorer.

4 Getting Started

1. Connect the Hardware as described in the section 'Hardware Setup'
2. Power up the sensor (switch on the 9-12 V power supply)
3. Press the 'Reset' on the STM-Board (black button) → restarts the micro controller to initialize the communication protocols
4. Readout data stream on the PC:
    a. With arbitrary terminal software:
        i. Start the terminal software
        ii. Configure the COM-port parameters according to Table 1
        iii. Open the connection
    b. With 'GyroLive' Software:
        i. Start the 'GyroLive' software (double click the *.exe file)
        ii. With correctly installed STM hardware drivers, the Software automatically chooses the COM port connected to the STM-Board (see Figure 2)
        iii. Press the 'START'-button to readout the gyroscope
        iv. To stop the readout, press 'STOP' (see Figure 3)
        v. Press 'Calibrate' while the sensor is not moving to determine the Sensor offset. To activate the sensor offset correction, the checkbox has to be activated
        vi. In order to get Values in °/s, activate the sensor scale factor checkbox
        vii. After calibrating and scaling the signal, the total angle is shown by activating the 'Compass'. It shows the integral over time of the angular rate resulting in the total angle. (Figure 4)
        viii. The data stream can be stored by activating the 'save data stream' option. A data file in the same folder as the 'GyroLive.exe' is created and automatically labeled with date and time stamp (Figure 5).

Table 1: COM port settings

Setting	Value
Speed (Baud)	2000000
Data bits	8
Stop bits	1
Parity	None
(CTS) Flow control	None
(newline at)	'LF' (line feed)

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[4] USB Driver ST Link: http://www.st.com/en/development-tools/st-link-v2.html
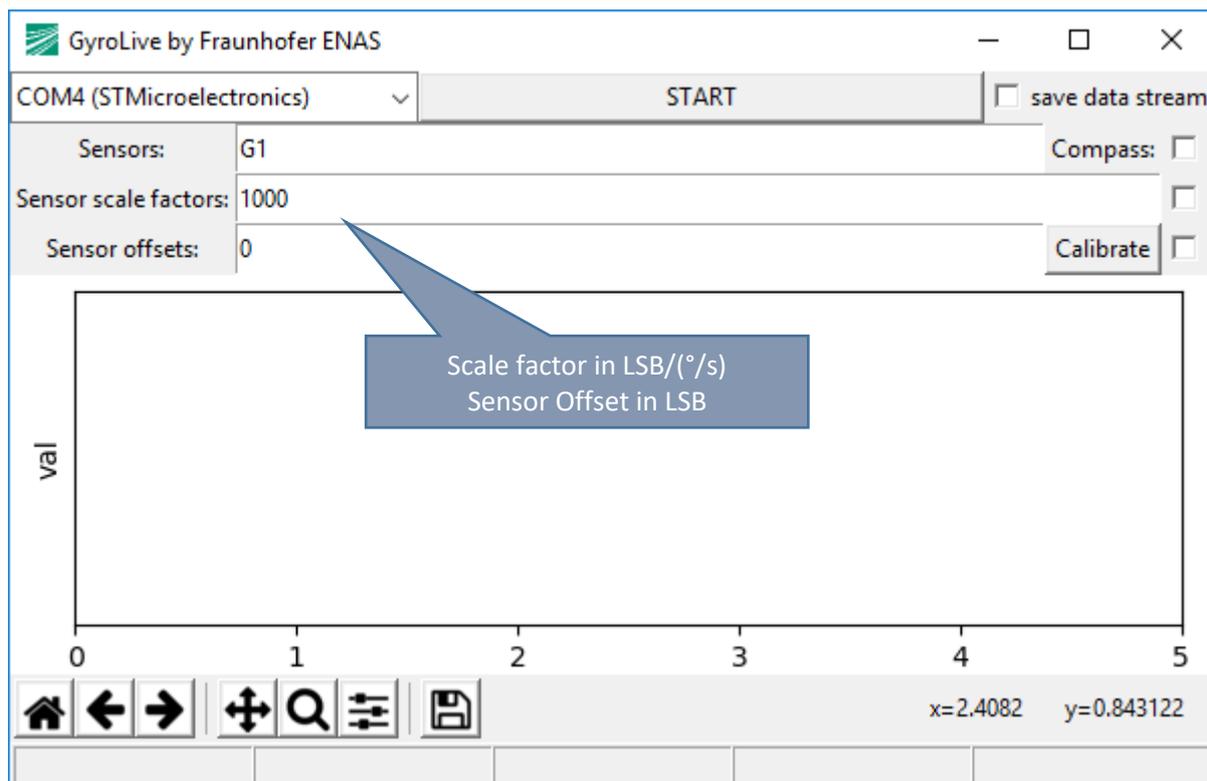
Figure 2: 'GyroLive' screenshot after starting the software, STM-Board is connected to COM4
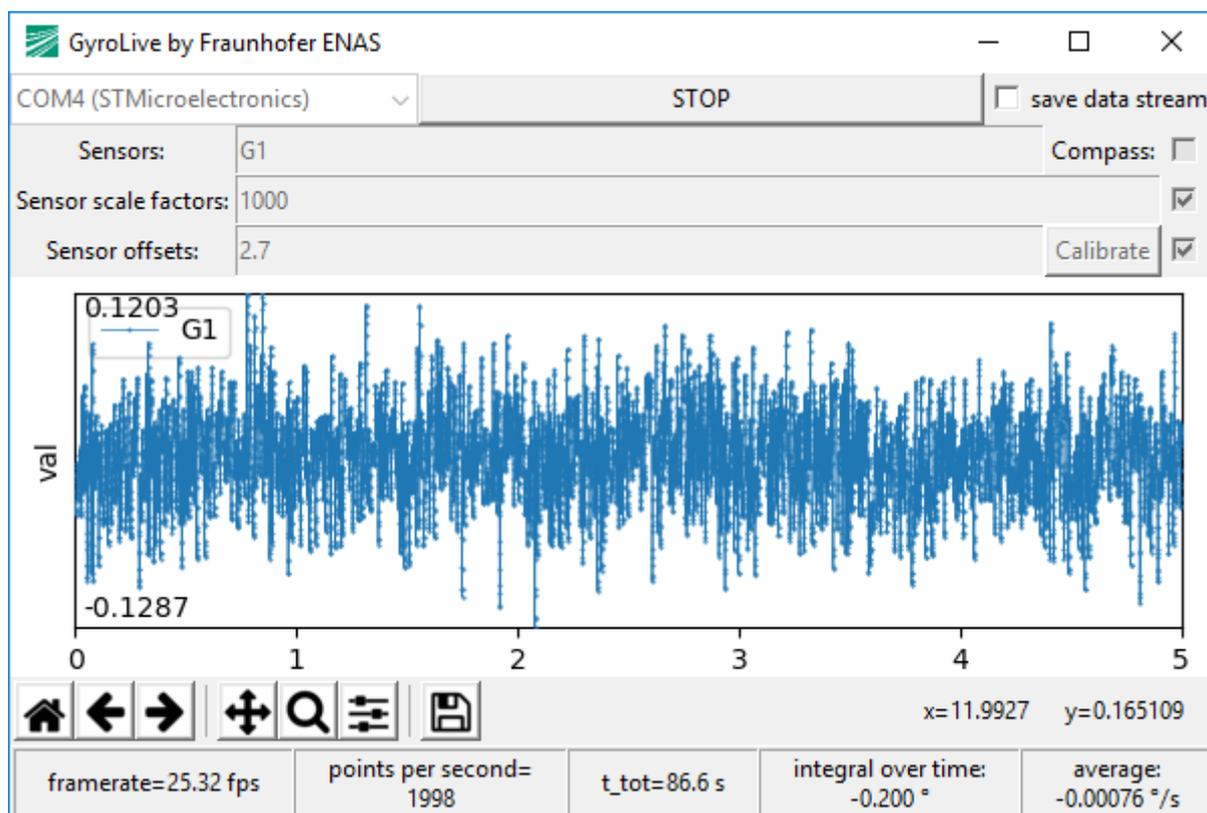
Figure 3: screenshot after starting the readout with offset correction and scaling active
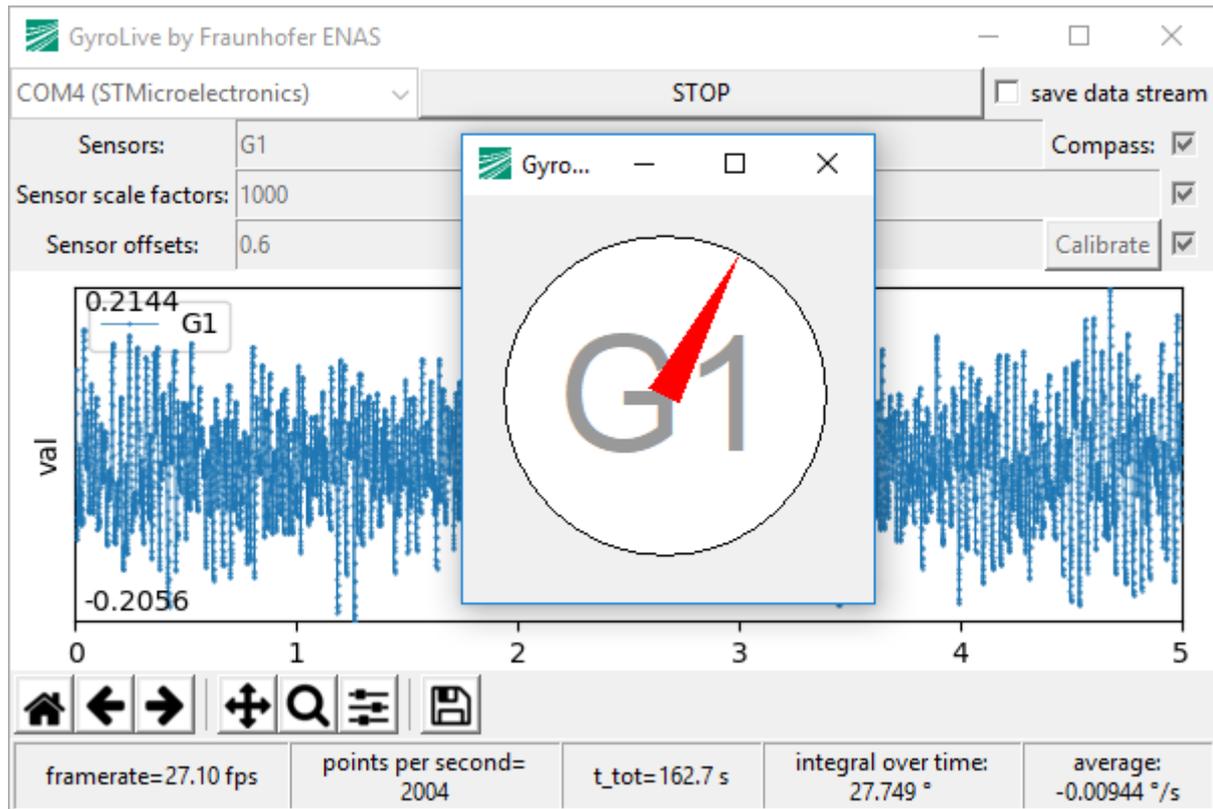
Figure 4: screenshot from a readout with compass activated

Figure 5: example of a saved data stream