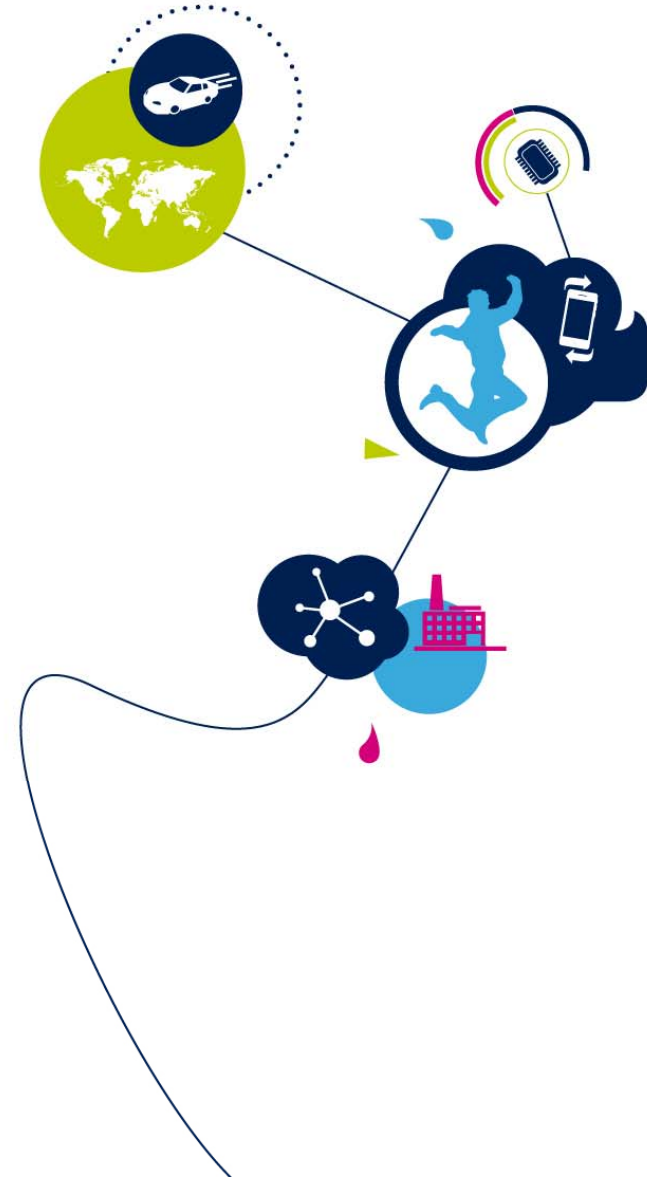


Using the Teseo-LIV3F as an I2C Positioning Sensor

ADG/Positioning – May 14, 2018



- The Teseo-LIV3F GNSS module embeds a 3rd generation of ST's single-die standalone positioning receiver ICs (Teseo III) able to work simultaneously on multiple constellations (GPS, GLONASS, Beidou, Galileo, QZSS).
- The Teseo-LIV3F's I2C interface emits the same NMEA 0183-Rev.3.1 stream available on its UART interface.
- The Host MCU should continuously poll the Teseo-LIV3F on I2C bus to access real-time positioning data
- Certain applications only need to read the current position on-demand (with no interest in the NMEA stream) using the Teseo-LIV3F as an I2C sensor (for example, as a gyroscope, accelerometer, etc.)

- The Host could use the *\$PSTMNMEAREQUEST* command to request on-demand only specific NMEA message based on a message-list-bitmap:

```
$PSTMNMEAREQUEST , <msg-low> , <msg-high> * <checksum>
```

- Use case:
 - Host requests the required NMEA message;
 - Teseo-LIV3F responds with the requested NMEA message;
 - Host parses only the NMEA messages it wants when needed

Prepare the Teseo-LIV3F module

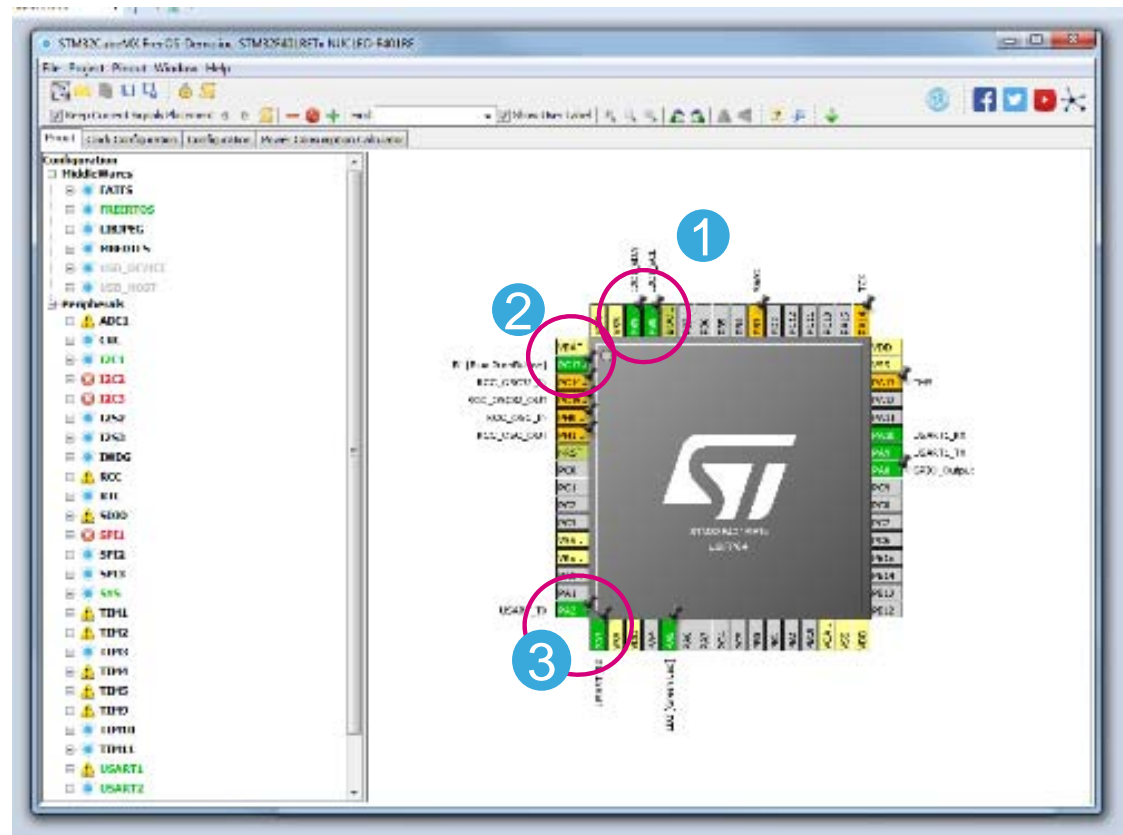
- Reset the I2C-MessageList
 - Send the commands:
 - `$PSTMCFGMSGL,3,1,0,0`
 - `$PSTMSAVEPAR`
- Disable echo-ing commands (CDB-ID 227[0])
 - `$PSTMSETPAR,1227,1,2`
 - `$PSTMSAVEPAR`
- **Now the NMEA-Message-List on I2C port is empty; this means that:**
 1. **Teseo-LIV3F will not fill the I2C-buffer with an autonomous NMEA messages**
 2. **Teseo-LIV3F is still able to respond to NMEA command coming from Host**

Prepare the STM32CubeMX Project [1/4]

Using the **STM32CubeMX** graphical software configuration tool to configure your application

Create a project on a **Nucleo-F401RE**:

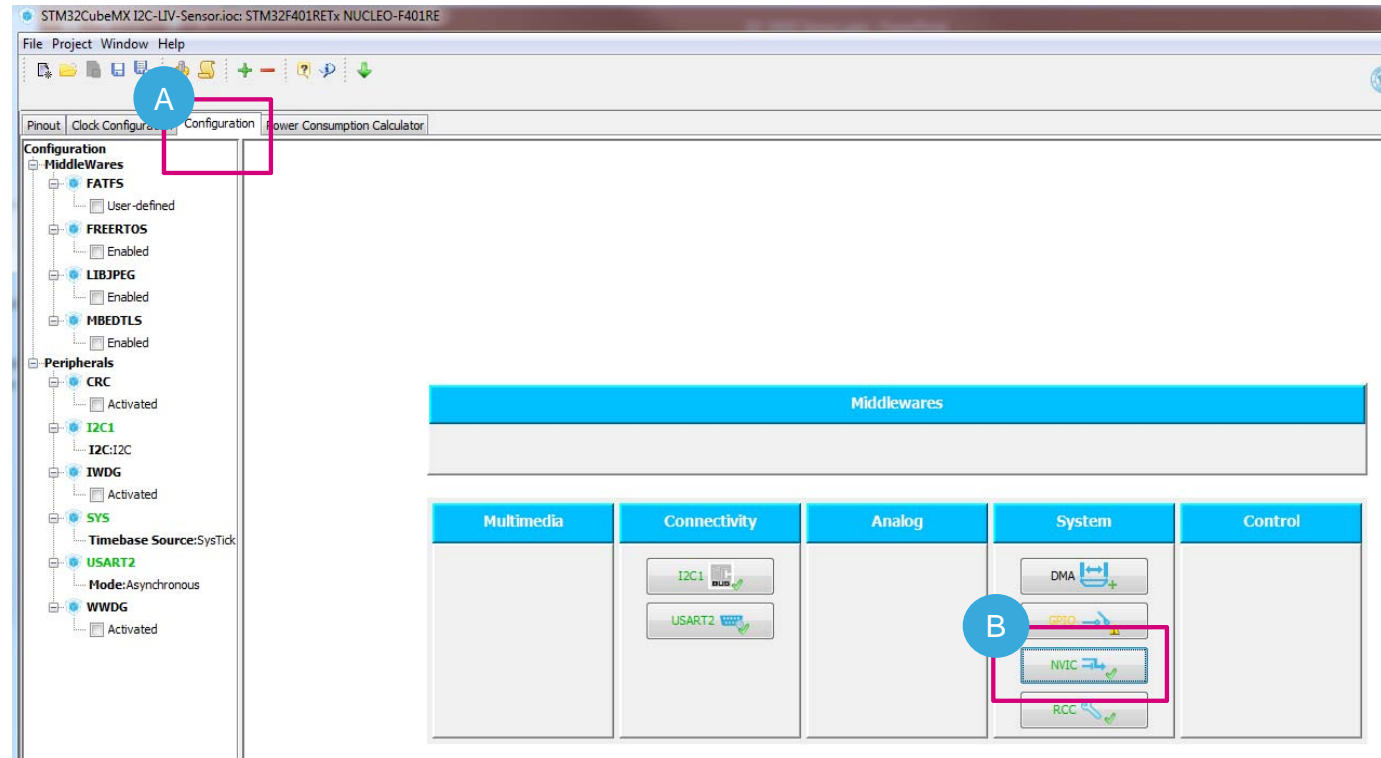
- 1 Enable I2C-1 on PB9-PB8
- 2 Enable Blue-Button on PC13
- 3 Enable USART-2



Prepare the STM32CubeMX Project [2/4]

3 Enable Blue-Button Interrupt (EXTI interrupt)

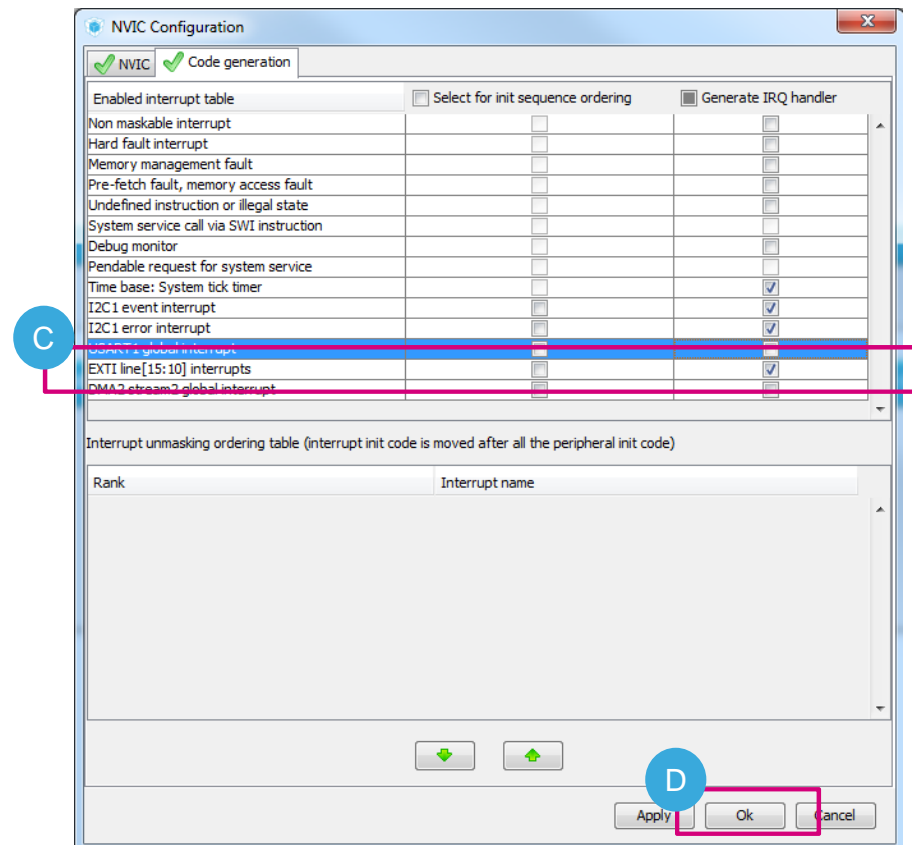
- A Open *Configuration* Tab
- B Press *NVIC* button



Prepare the STM32CubeMX Project [3/4]

3 Enable Blue-Button Interrupt (EXTI interrupt)

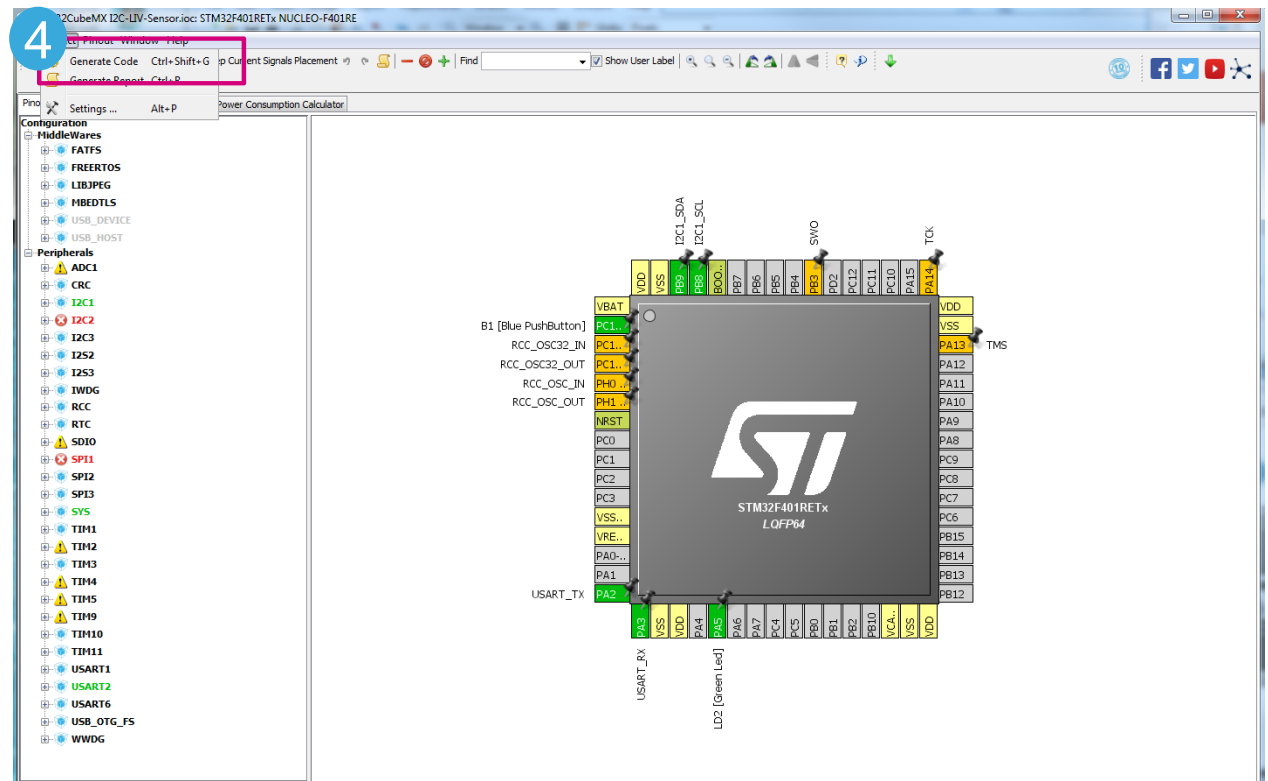
- C Enable EXTI *IRQ handler*
- D Press *OK button*



Prepare the STM32CubeMX Project [4/4]

4 Generate the C initialization code

Now you can open your IDE



Edit the C-Code

```
void Console_Write(uint8_t *string){
    HAL_UART_Transmit(&huart2, string, strlen((char *)string), 1000);
}

static volatile _read = 0;

1 void HAL_GPIO_EXTI_Callback(uint16_t GPIO_Pin)
{
    _read = 1;
}

void app_main()
{
    #define Teseo_I2C_7bits_Addr  0x3A
    #define I2C_BUF_SIZE  180

    int i;
    static const char *gpgga_msg = "$PSTMMNEAREQUEST,2,0\n\r";
    static const char *gpgll_msg = "$PSTMMNEAREQUEST,10000,0\n\r";
    char read_buf[I2C_BUF_SIZE];
    Console_Write("Booting\n\r");

    while (1) {
        HAL_I2C_DeInit(&hi2c1);
        HAL_I2C_Init(&hi2c1);

        if (_read == 1) {
            _read = 0;

            Console_Write("Sending commands...");

            2 HAL_I2C_Master_Transmit(&hi2c1, Teseo_I2C_7bits_Addr << 1, (uint8_t *)gpgll_msg, strlen(gpgll_msg), 2000);

            Console_Write(" got:... \r\n");

            3 for (read_buf[I2C_BUF_SIZE-1] = 0; read_buf[I2C_BUF_SIZE-1] != 0xff; ) {
                HAL_I2C_Master_Receive(&hi2c1, Teseo_I2C_7bits_Addr << 1, read_buf, I2C_BUF_SIZE, 2000);

                for (i = 0; i < I2C_BUF_SIZE; ++i)
                    if (read_buf[i] != 0xff)
                        HAL_UART_Transmit(&huart2, &read_buf[i], 1, 1000);
            }

            Console_Write("\r\n");
        }
    }
}
```

1 Blue-button Call-back

2 I2C-Write to request the message

3 I2C-Read to read the message



Run and final conclusion

10

1 Run and view result on a terminal emulator

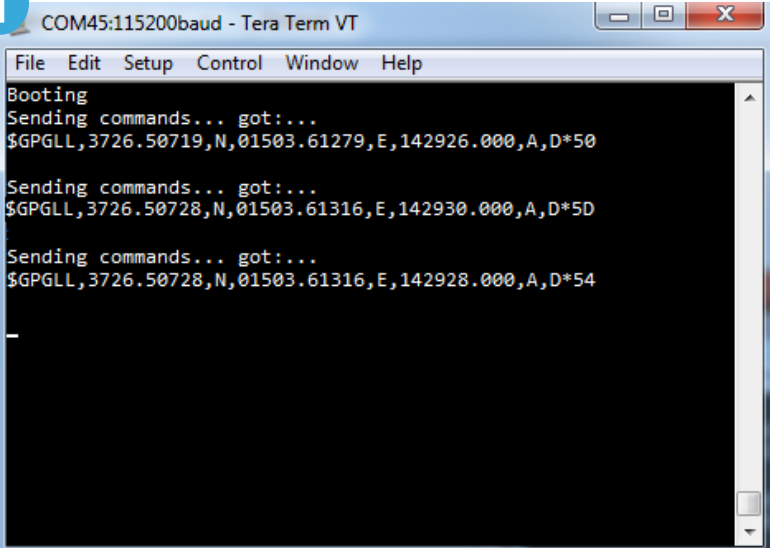
2 **Final conclusion:**

The Host MCU doesn't need to continuously pull the Teseo-LIV3F module

The Host MCU can request any NMEA message it wants when needed

The Host MCU has to parse only the needed NMEA message

1



```
COM45:115200baud - Tera Term VT
File Edit Setup Control Window Help
Booting
Sending commands... got:...
$GPGLL,3726.50719,N,01503.61279,E,142926.000,A,D*50

Sending commands... got:...
$GPGLL,3726.50728,N,01503.61316,E,142930.000,A,D*5D

Sending commands... got:...
$GPGLL,3726.50728,N,01503.61316,E,142928.000,A,D*54

-
```