Step 3: UART and new board introduction

Target description
Following this tutorial, you will:
- get familiar with the L475 IoT Node Discovery Board,
- learn how to program and use a RS232 serial link on previously used NUCLEO-L476RG
- L475 IoT Node Discovery Board (B-L475E-IOT01A).

Prerequisites
Previous tutorials:
Step 1: Tools installation and first test
Step 2: Blinking LED with STM32CubeMX and HAL

Hardware
- STM32L4 Discovery kit IoT node (B-L475E-IOT01A), available on www.st.com/en/evaluation-tools/b-l475e-iot01a.html
- USB cables 'Type-A to Mini-B' and 'Type-A to Micro-B'

Literature
- STM32L4 Online Training: STM32L4 Peripheral_USART
- UM1F727 Getting started with STM32 Nucleo board software development tools

Stages
- 1: Introduction to the UART I/F on NUCLEO-L476RG
- 2: Introduction of L475 IoT Node Discovery Board
- 3: Introduction to the UART I/F on L475 IoT Node Discovery Board
CREATE NUCLEO-L476RG UART PROJECT USING CUBEMX

- Create a new project using STM32CubeMX.
- Select NUCLEO-L476RG board using board selector.
- Answer Yes to Initialize all peripherals with their default Mode? popup.
- In Pinout tab that USART2 mode in configured to Asynchronous, PA2 is connected to USART2_TX and PA3 is connected to USART2_RX.

- Click on USART2 button in Configuration tab and set Word Length to 8 Bits.
- Make sure that the settings are as in the screenshot below:

- Disable all other USARTs.
- Click on Apply then OK.

- Go to Project menu and click on Settings. Select TrueSTUDIO as Toolchain / IDE, give a name to your project then click OK.
- Click on Project then Generate Code and accept to open your project in TrueSTUDIO.

```c
huart2.Instance = USART2;
huart2.Init.BaudRate = 115200;
huart2.Init.WordLength = UART_WORDLENGTH_8B;
huart2.Init.StopBits = UART_STOPBITS_1;
huart2.Init.Parity = UART_PARITY_NONE;
huart2.Init.Mode = UART_MODE_TX_RX;
huart2.Init.HwFlowCtl = UART_HWCONTROL_NONE;
huart2.Init.Oversampling = UART_OVERSAMPLING_16;
huart2.Init.OneBitSampling = UART_ONE_BIT_SAMPLE_DISABLE;
huart2.AdfvFeatureInit = UART_ADFVFeature(NO_INIT);
```
EDIT AND COMPILE NUCLEO-L476RG UART PROJECT USING TRUESTUDIO


- Insert the following lines:
  ```c
  uint8_t Test[] = "Hello World !!!\n"; // Data to send
  HAL_UART_Transmit(&huart2, Test, sizeof(Test), 10); // Sending in normal mode
  HAL_Delay(1000);
  ```
  
  between /* USER CODE BEGIN 3 */ and /* USER CODE END 3 */

- Click on Build button to compile the project.
- Click in Debug button to run the software.
- Click on Console button to open a console, select Data bits: 8 and click OK. Port name may differ on your PC.
- TrueSTUDIO will open Debug perspective. Click on Resume button to execute your code.
- Terminal Window will display Hello World !!! string confirming you were able to program and use RS232.
QUICK VIEW
The B-L475E-IOT01A Discovery kit for IoT node allows users to develop applications with direct connection to cloud servers.

KEY FEATURES
The Discovery kit enables a wide diversity of applications by exploiting low-power communication, multiway sensing and ARM® Cortex®-M4-core-based STM32L4 Series features.

MORE INFORMATION ON ST WEBSITE
CREATE B-L475E-IOT01A UART PROJECT USING CUBEMX

- Create a new project using STM32CubeMX.
- Select B-L475E-IOT01A board using board selector.
- Answer Yes to the following popup Initialize all peripherals with their default Mode ? .
- Verify in Pinout tab that USART1 mode in configured to Asynchronous.
- Click on USART1 button in Configuration tab and set Word Length to 8 Bits .

- Verify that Baud Rate is 115200 Bits/s, Parity is None and Stop Bits is 1 .
- Disable all other USART.
- Click on Apply then OK .

- Go to Project menu and click on Settings. Select TrueSTUDIO as Toolchain / IDE , give a name to your project then click OK.
- Click on Project then Generate Code and accept to open project in TrueSTUDIO.

```
huart1.Instance = USART1;
huart1.Init.BaudRate = 115200;
huart1.Init.WordLength = UART_WordLength_8B;
huart1.Init.StopBits = UART_StopBits_1;
huart1.Init.Parity = UART_Parity_NONE;
huart1.Init.Mode = UART_Mode_TX_RX;
huart1.Init.HwFlowCtl = UART_HwFlowCtl_NONE;
huart1.Init.OverSampling = UART_OverSampling_16;
huart1.Init.OneBitSampling = UART_OneBitSampling_DISABLE;
huart1.AdvancedInit.AdvFeatureInit = UART_AdvFeatureInit_DISABLE;
```
EDIT AND COMPILE B-L475E-IOT01A UART PROJECT USING TRUESTUDIO

- Insert the following lines:
  ```c
  uint8_t Test[] = "Hello World !!!\n\n"; //Data to send
  HAL_UART_Transmit(&huart1, Test, sizeof(Test), 10); //Sending in normal mode
  HAL_Delay(1000);
  ```
- Click on **Build** button to compile the project.
- Click in **Debug** button to run the software.
- Click on **Console** button to open a console, select **Data bits: 8** and click **OK**. Port name may differ on your PC.
- TrueSTUDIO will open Debug perspective. Click on **Resume** button to execute our code.
- Terminal Windows will display *Hello World !!!* string confirming we were able program and use RS232.
Conclusion

Now you are able to:

- use the UART I/F on NUCLEO-L476RG
- use L475 IoT Node Discovery Board
- use the UART I/F on L475 IoT Node Discovery Board