

STM32F042 USB CDC Application Development

September 10, 2014

Overview

Half the battle in becoming familiar with the STM32F042 chip is getting input down to the chip and output back to the desktop. Typically this means using a USB connection operating as a CDC device, serial drivers on the embedded and desktop side, high level format conversion functions such as scanf and printf and an easy to use, non-dedicated hardware, programming utility like DfuSE. SOC Robotics has prepared a simple USB CDC example template project for the STM32F042 chip that accomplishes that task based on ST supplied libraries and the CooCox IDE for Windows. The example project gets you to hello world fast so you can begin exploring the power of the STM32F042 processor. We created this template both for ourselves (we have a few projects using this chip in the works) and users interested in developing applications for the STM32F042.

Installing ARM Tool chain

First install the pre-built ARM GNU Tool chain for ARM Cortex-M & Cortex-R processors (Cortex-M0/M0+/M3/M4, Cortex-R4/R5/R7). The tool chain is available here: <https://launchpad.net/gcc-arm-embedded>

Test the tool chain by entering a command window and execute the following command:

```
arm-none-eabi-gcc -version
```

which should return (or whatever the latest version is):

```
arm-none-eabi-gcc (GNU Tools for ARM Embedded Processors) 4.7.4 20130913 (release) [ARM/embedded-4_7-branch revision 202601]
Copyright (C) 2012 Free Software Foundation, Inc.
This is free software; see the source for copying conditions.  There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

If you get a command not recognized error then the correct path to the tool chain is not set. Edit the path environment variable with the correct path. If a different ARM tool chain is identified then it must be removed or the path to it removed.

Installing STLink and DFuSe

Download and install STLink and DFuSe. STLink is a programming utility while DFuSe is a DFU programming utility. DFuSe is useful for programming STM32F042 based boards with DFU support. The STM32F042 processor is programmed using ST-Link. Both ST-Link and DFuSe will require .inf drivers for proper use. Download ST-Link and DFuSe here:

<http://www.st.com/web/catalog/tools/FM146/CL1984/SC724/SS1677/PF251168>

<https://code.google.com/p/armazila/downloads/detail?name=um0412.zip&can=2&q=>

Installing the ST Virtual COM driver

In order to communicate with the STM32F042 as a CDC serial device an ST Virtual COM driver must be installed on the Windows machine. Download the driver here:

<http://www.st.com/web/en/catalog/tools/PF257938>

Once downloaded and installed go to the created main folder and execute the installer exe based on your machine target (x86 or 64 bit).

Installing CooCox 1.7.7

CooCox is an integrated IDE for embedded application development. The latest version is 1.7.7. Download the IDE here: <http://www.coocox.org/index.html>

Follow the installation procedure on the website. Be sure to point the IDE to the correct ARM tool chain before compiling the USB CDC example.

Installing STM32F042 USB CDC Template with USB CDC Support from SOC Robotics

SOC Robotics has prepared a template project for the STM32F042 chip that includes USB CDC support with low memory PrintInt and PrintFtoa support as the full printf functions will not fit the chips limited 32K flash so you can start developing immediately without worrying how to get output back to the desktop. Also included is an interrupt driven serial driver with PutChar1 and GetChar1 support for USART1 plus a number of timer configuration functions.

Download the template project here:

www.soc-robotics.com/downloads/STM32F042%20CDC%20USB%20Project.zip

Loading the Application

Follow the example tutorials to become familiar with the CooCox IDE environment. The project comes with the example application pre-compiled.

If you make any changes to the application re-compile to generate a new .hex file. Download this file to the STM32F042 target using either ST-Link or the on chip DFU bootloader compatible with Dfuse. Re-power the board – this starts the USB CDC application example.

The STM32F042 has a DFU bootloader pre-loaded on the chip. Activate the bootloader by pulling BOOT1 high. This starts the DFU bootloader. You will need to load the appropriate DFU bootloader inf driver to allow Dfuse to communicate with the bootloader.

That's it.