

STM32F042/STM32F072/STM32F303 NanoM, PaellaM, PicoM, PiMotionM Application Development

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Overview

Half the battle in becoming familiar with the STM32F042/STM32F072/STM32F303 chip on the SOC Robotics ST ARM7 boards is getting input down to the board 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. All SOC Robotics ST ARM7 processing boards come with project source code files based on ST supplied libraries and the CooCox IDE V1.7.8 for Windows. The example projects get you up and running quickly. Most of the projects contain code to setup peripherals (serial, usb, imu sensors, spi, wireless, etc). We created these projects and provide the complete source code so you can focus on developing your application without having to re-create all the software plumbing necessary for sensor integration, wireless communication and display operation - this saves man months of initial effort.

Install 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). There are several versions - latest is version 6 - many of the SOC projects were developed with version 4.9.

The tool chain is available here: <https://launchpad.net/gcc-arm-embedded>

Go to the GNU gcc bin folder and execute the following command:

```
C:\Program Files (x86)\GNU Tools ARM Embedded\4.9 2015q2\bin>arm-none-eabi-gcc -v
```

which should return the version:

```
gcc version 4.9.3 20150529 (release) [ARM/embedded-4_9-branch revision 2242881] (GNU Tools for ARM Embedded Processors)
```

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.

Install DFuSe and DFU File Manager

Download and install DFuSe. DFuSe is a DFU (Device Firmware Upgrade) programming utility and includes the DFU File Manager (see Using DFU File Manager and DFuSe Application Note for usage information). DFuSe is useful for programming F0/F3/F4 based boards with DFU support. All SOC Robotics ST boards can be re-flashed using DFuSe without the need for any special programming hardware. DFuSe requires .inf drivers for proper use which are installed by following the ST Virtual COM driver installation procedure below. Download DFuSe here:

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

Optionally Install STLink

Optionally download and install STLink if you want or need hardware debugging. STLink is a programming utility while DFuSe is a DFU programming utility. SOC ST boards can be

programmed and debugged using ST-Link. STLink requires .inf drivers for proper use and extra ST hardware and will not be covered here. CooCox supports hardware debugging via STLink and other third party debuggers. Download STLink here:

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

Install ST Virtual COM driver

To communicate with the STM32Fxxx as a CDC serial device or to use the DFU programming feature an ST Virtual COM driver must be installed on your Windows machine. There are two different Virtual COM drivers - V1.3.1 and V1.4.0. ST provides V1.4.0 on it's web site. Depending on which project download is used, the operating system (Win7, Win8 or Win10) and the ST libraries used the latest Virtual COM driver sometimes has reliability issues so rolling back to V1.3.1 corrects these issues. Download the driver here (which will install driver version 1.4.0):

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

This download requires submitting your email address.

Or you can download driver version 1.3.1 here (which doesn't require an email address):

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

Install CooCox 1.7.8

CooCox is an integrated IDE for embedded application development. The latest standalone version is 1.7.8. Recommend not downloading any of the Version 2.0 IDE's - they are cloud based and not very reliable. CooCox compiles and links C/C++ applications generating a .elf and .hex file. The .hex files is then converted to a .dfu file using ST's DFU File Manger and downloaded to the target board using DFuSe. Both utilities do not require any special hardware to program any of SOC Robotics ST based processing boards.

Download the IDE here: <http://www.coocox.org/download/Tools/CoIDE-1.7.8.exe>

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. Download the GNU tool chain and install it before installing the CooCox IDE.

Install Board Specific CooCox project files from SOC Robotics

SOC Robotics has prepared CooCox IDE compatible board specific project files for each of it's unique processor boards such as the NanoM, PicoM, PaellaM, PiMotionM and MK4FQ. Each of the boards supports one or more processors and one of more projects. For example, NanoM is available with either an STM32F042, STM32F072 or STM32F303 processor with project files that run wireless communication for the RF24L01 and/or a grbl 0.9j port. Each project has source code to integrate standard peripherals such as timers, serial, spi, usb and i2c along with drivers for all the sensors available on these boards such as the MPU-9150 9DOF and wireless devices (RF24L01) and OLED display (SSD3601).

Board specific projects files for these boards are available on the SOC Robotics download page.