n-DAP

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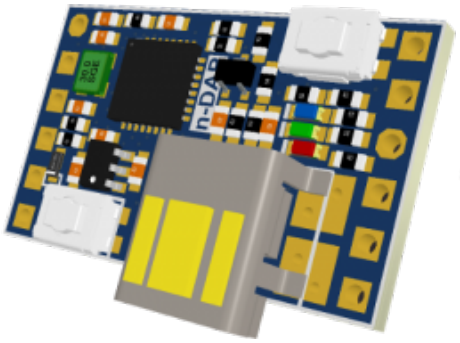
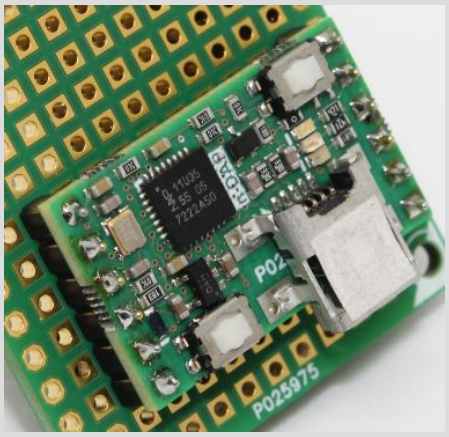
n-DAP

n-DAP is an mbed-enabled development board from the n-Blocks family, with a reduced form factor.



n-DAP



mbed enable board

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Authors	NC
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Based on	
Categories	
Repo	Bitbucket

Overview

The n-DAP-mbed enabled board had been designed by Nimbus Research Center for users to quickly design and develop next generation Internet of things (IoT) applications. The board can facilitate USB drag and drop firmware programming of ARM based CPU boards. It comes with the NXP Semiconductor's LPC11U35 MCU which belongs to the enhanced line of LPC11U3x, ARM-Cortex M0 based, low-cost 32-bit MCU family. The LPC11U35 operate at CPU frequencies of up to 50 MHz and brings unparalleled design flexibility and seamless integration to today’s prototyping and development solutions. The board provides access to the CPUs, ADC, UART and I2C pins which allow the user to use it as a stand alone development board when programmed with custom firmware.

DAP interface

The n-DAP (if flashed with a binary image) behaves as a USB to JTAG/SWD bridge between the computer and target's debug access port, using the ARM CMSIS DAP for user friendly programming and debugging. It enables firmware development for n-Blocks boards using the ARM mbed platform and can also be used with industry standard tools such as Keil and IAR.

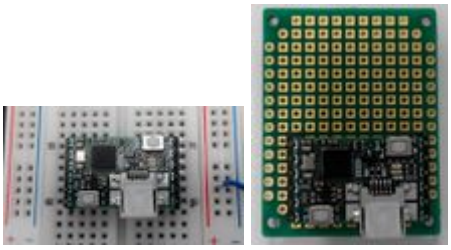
The CMSIS-DAP Interface Firmware provides:

- **USB MSC Mass Storage Device for drag and drop programming of the target chip**
- **USB CDC Communications Device Class for Serial Communication with the target chip**
- **USB HID CMSIS-DAP for debugging**
- **USB bootloader for updating the interface firmware itself**

MCU Features

- ARM Cortex-M0 processor
- 50 MHz max CPU frequency
- Built-in Nested Vectored Interrupt Controller (NVIC)
- 128 Kbytes of Flash memory
- 12 kB SRAM data memory
- 4 to 32 MHz crystal oscillator
- 12 MHz high-frequency Internal RC oscillator
- Internal low-power, low-frequency WatchDog Oscillator
- 54 GPIOs with configurable pull-up/pull-down resistors

- 8 GPIOs can be selected as edge and level sensitive interrupt sources
- Programmable WatchDog Timer with a dedicated internal WatchDog Oscillator (WDO)
- 10-bit ADC
- UART
- I2C
- USB 2.0 FS
- General purpose Timer (4)
- Single 3.3 V power supply (1.8 V to 3.6 V)
- Temperature Range: -40 ºC to +85 ºC

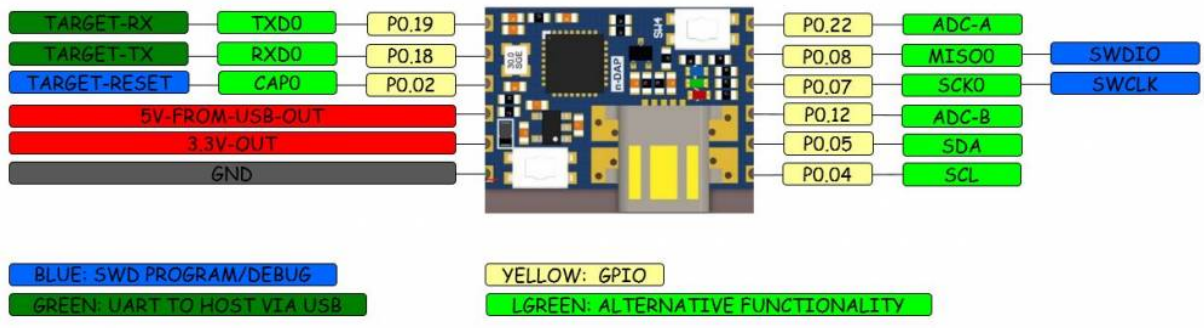


Main Features Of The Board

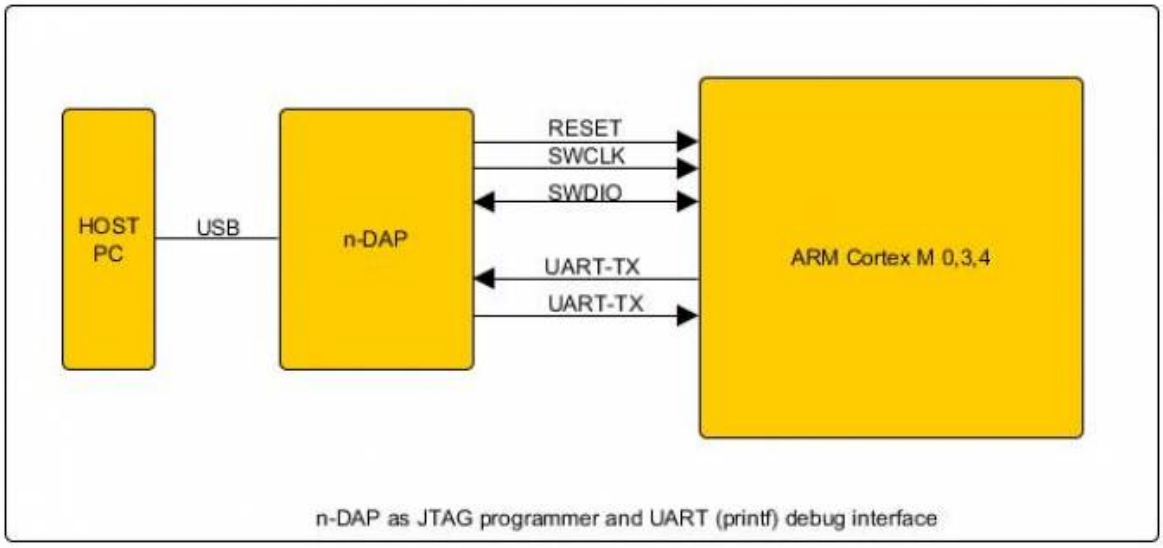
- Three User LEDs
- Two push buttons
- Two modules(I2C, SPI) on-board
- USB 2.0 FS with Micro connector
- DAP_Link
- Power-supply options: USB 2.0 FS, DAP_Link USB
- Breadboard-able: 1/10 inch connector pitch
- Robust USB mini connector:

Board Pinout

The board has 12 pins, 6 for each side, If the board is used as SWD interface, only 3 pins for signals and 2 pins for power are needed.

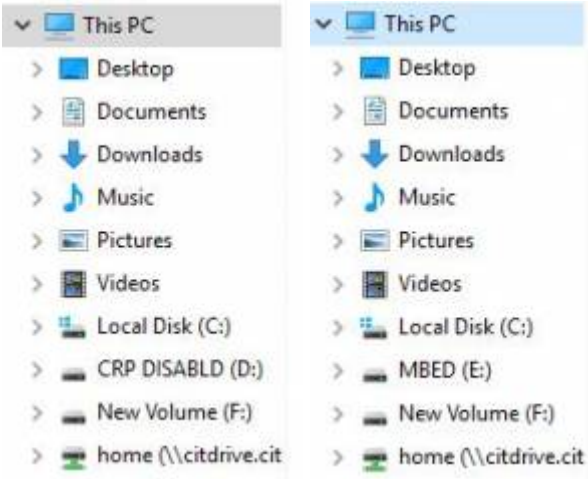


Block Diagram: Connections to use as a programming/debugging interface



Getting Started

- Use the USB lead to connect your mbed to a PC
- The red LED will be on, indicating it has power
- Press the buttons together (SW4 +SW3).Release the button SW4
- Release the button SW3, the CPU would be in ISP mode and appears as Disk with name `'“CRP DISABLD”'`
- If the CMSIS-DAP (named also mbed_HDK) is programmed, then after reset n-DAP appears as a disk with the mame `MBED`



Examples

Blink example with mbed-CLI

☐ [Nikos] add the code here

- Check the working target setup

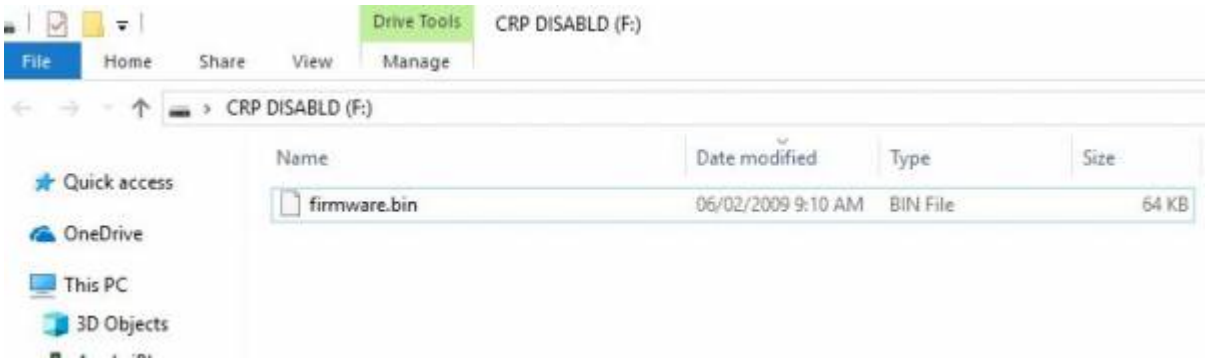
```
F:\opt\WORKSPACES\mbed\n-bed_LPC11U35_blinky>mbed target
[mbed] LPC11U35_501
```

- Compile

```
F:\opt\WORKSPACES\mbed\n-bed_LPC11U35_blinky>mbed compile
Building project n-bed_LPC11U35_blinky (LPC11U35_501, GCC_ARM)
Scan: .
Scan: mbed
Scan: env
+------------+-------+-------+------+
| Module     | .text | .data | .bss |
+------------+-------+-------+------+
| Fill       |   275 |     0 |    0 |
| Misc       |  3725 |    16 |  112 |
| Subtotals  |  4000 |    16 |  112 |
+------------+-------+-------+------+
Allocated Heap: 128 bytes
Allocated Stack: 128 bytes
Total Static RAM memory (data + bss): 128 bytes
Total RAM memory (data + bss + heap + stack): 384 bytes
Total Flash memory (text + data + misc): 4016 bytes
Image: .\.build\LPC11U35_501\GCC_ARM\n-bed_LPC11U35_blinky.bin

F:\opt\WORKSPACES\mbed\n-bed_LPC11U35_blinky>
```

- Remove previous firmware from CPU flash by deleting the file `'firmware.bin'`



- **Make sure the folder is empty**, if not then the device can not be programmed
- Drag-drop the new compiled .bin file to the mbed board. It should appear as **firmware.bin**

Technical References

For more information, please refer to:

LPC11U35

- https://www.nxp.com/docs/en/data-sheet/LPC11U3X.pdf

DAPLink

- https://os.mbed.com/handbook/DAPLink

Downloads

LPC1768/LPC812

- LPC11U35-Firmware for communicating with LPC1768 (Does not create virtual serial port)
- SWDAP-LPC11U35 NXP LPC1768 PREBUILD IMAGE (Creates a virtual serial port)

LPC1114FN28

- Firmware LPC1114FN28 (Firmware to use n-DAP with the non-SMD LPC1114FN28 DIP-28)

nRF51822

- Seeed studio wiki Arch BLE
- Seeed studio wiki File:Lpc11u35 nrf51822 if mbed.bin.zip
- Bootloader for BLE mbug

NXP K64F

- https://os.mbed.com/platforms/SWDAP-LPC11U35/NXP K64F
- https://os.mbed.com/media/uploads/chris/lpc11u35_swdap_k64f_if_crc.bin bin

CMSIS-DAP Interface Firmware

- CMSIS-DAP Interface Firmware

Related articles in this Wiki

- n-dap
- n-lp

nblock, CPU, modbus

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