

EQUIPMENT SET UP

Introduction

During the first lecture, you have received all the necessary equipment for the practical sessions of the course. This equipment consists of:

- Nintendo DS + Case
- Power charger (Swiss/European socket)
- M3i Zero cartridge or R4 cartridge
- MicroSD memory card
- USB to single-wire programming adapter (Only with M3i Zero cartridge)
- USB adapter for the microSD card



In this tutorial you are going to learn how to set up the equipment that will be used throughout all the laboratory sessions of the course, as well as learning how to check if the Nintendo DS (NDS) is operational.

1. NDS cartridge

The cartridge that you have received (M3i Zero or R4), is the element of the equipment that enables the storage and execution of your developed programs for the Nintendo DS during the course. However, before it can be used, it must be configured and set up for its use on the Nintendo DS. There are two types of cartridges, one is the M3i Zero and the other is R4. You will receive one of the two cartridges. Depending on which one you have, the configuration steps are different. If you have received an M3i Zero cartridge, please follow the steps in section 2 and section 3. Then, if you have received an R4 cartridge, follow the steps in section 4.

2. Downloading and preparing the NDS M3i cartridge software

The following steps describe the required steps to download the software and prepare it to be installed in the M3i cartridge:

- 1.1. Go to the Moodle site of the course and download the compressed file of the *Cartridge Software M3i link (M3i.zip)*.
- 1.2. Find the provided USB adapter for the microSD card, which is a little plastic adapter with the M3 symbol, and insert the microSD card (the smallest one) in the blue rounded side of the adapter. Both the M3 symbol of the adapter and text of the microSD card should be on the same side.
- 1.3. Insert the adapter into the USB port of the computer.

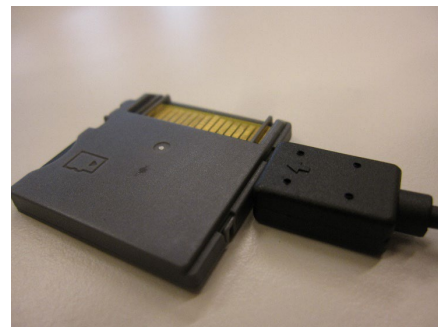
- 1.4. The operating system (OS) of the PC will automatically recognize the unit as an external hard disk in a few seconds. Do not disconnect the USB card until the required drivers to access the microSD card have been correctly installed.
- 1.5. Open the newly added microSD unit and uncompress the downloaded cartridge software (M3.zip) inside that unit. At the end of the process, 2 folders (*System* and *NDS*) and a file (*F_CORE*) will appear in the unit.
- 1.6. Remove the unit in the safe unplug option of the OS.

3. Installing software in the NDS M3i cartridge

The files that you have stored in the microSD card need to be installed in the existing microcontroller of the cartridge. These files constitute a small OS kernel that is able to manage the hardware of the cartridge, as well as enabling the interaction between the NDS and our microSD storage unit. The following steps proceed with the installation of the files of this OS kernel for input/output interaction between the NDS and the storage unit:

- 3.1. Insert the microSD card, prepared in the previous section, inside the M3 cartridge device. Notice that there is a microSD slot in one of the sides of the device and that there is a small drawing on the back of the device with a sketch of the orientation that must be used for the microSD card to be correctly inserted.

- 3.2. In addition to the microSD card adapter and the cartridge, in the provided equipment there is a special adapter with a USB connector on one side and a thin flat wire on the other one. This wire needs to be introduced in a tiny hole placed in the side opposite the microSD slot. Notice that in the connector there is an engraved arrow. Once inserted, this arrow must point to the opposite face of the cartridge where the sticker is located. ***This wire must be carefully plugged in the M3i cartridge, as it bends very easily and thus can be broken.***



- 3.3. Once the cable is plugged and the microSD card has been already inserted, plug the USB connector into a normal USB port of the PC. Then, an internal LED of the cartridge will start blinking, indicating that the configuration of the internal microcontroller is being performed.
- 3.4. Wait until the LED stops blinking (less than 1 minute) and remove the USB cable. The cartridge is already prepared. ***Do not disconnect the USB cable until the LED has stopped blinking, otherwise the microcontroller that downloads the programs in the NDS will not work properly.***
- 3.5. Go to section 5 to test the NDS and the cartridge.

4. Downloading and preparing the NDS R4 cartridge software

The following steps describe the required steps to download the software and install it in the R4 cartridge:



- 4.1. Go to the Moodle site of the course and download the compressed file of the *Cartridge Software R4* link (*R4.zip*).

NOTE: for the new R4 SDHC cartridge hardware (for example, from 2018 and on, as labeled in the top right corner), please download the compressed file from the Cartridge Software R4i-SDHC link (R4i SDHC YSMenu.zip)

- 4.2. Find the provided USB adapter for the microSD card, which is a little plastic adapter, and insert the microSD card (the smallest one) in the adapter.
- 4.3. Insert the adapter into the USB port of the computer.
- 4.4. The operating system (OS) of the PC will automatically recognize the unit as an external hard disk in a few seconds. Do not disconnect the USB card until the required drivers to access the microSD card have been correctly installed.
- 4.5. Open the newly added microSD unit and uncompress the downloaded cartridge software (*R4.zip* or *R4i_SDHC_YSMenu.zip* based on your cartridge version) inside that unit. At the end of the process,
 - For *R4.zip*: 2 folders (*R4iMenu* and *NDS*) and a file (*R4*) will appear in the unit.
 - For *R4i_SDHC_YSMenu.zip*: 2 folders (*Games* and *TTMenu*) and 4 additional files (*How to Install.txt*, *R4.dat*, *TTMenu.dat*, *YSMenu.nds*) will appear in the unit.
- 4.6. Go to section 5 to test the NDS and the cartridge.

5. Testing the NDS and the cartridge

If the previous steps have been completed correctly, the M3i cartridge or R4 cartridge is already configured, and it can be used to store your own programs and run them on the NDS. In order to test the cartridge and the correct configuration of its internal micro-controller, in this step you will learn how to transfer an already developed program for the NDS to the memory card, and then run it on your own NDS.

- 5.1. Go to the Moodle site of the course and download the *Tetris Full NDS Game* (*tetris.nds* file). In fact, files with the **.nds* extension are usually programs that have the right format to run on any NDS.
- 5.2. Extract the microSD card from the cartridge and insert it on the USB adapter, as explained in the first section of this document. Then, plug the adapter into a USB port of your PC.
- 5.3. In the unit that corresponds to the found microSD card, look for a folder called *NDS* (or *Games* if you are using *R4i_SDHC_YSMenu.zip*), and copy there the downloaded file in the previous step. The *NDS* folder is the location to download

- all your developed programs' files to be correctly read by the micro-controller of the cartridge and then automatically downloaded onto the memory of the NDS.
- 5.4. Extract the USB adapter using the safe mode extraction of the PC and introduce the microSD card back in the cartridge.
 - 5.5. Insert the cartridge in the corresponding slot of the NDS (as a normal game cartridge) and switch the device on. The power button is on the right lateral side of the NDS. If it is the first time that you use your NDS, the battery may be fully discharged, then use the provided power charger. The Nintendo DS contains internally a rechargeable lithium-ion battery with a capacity of 850 mAh. Thus, on a full four-hour charge with a completely new battery, the NDS can ideally operate for a maximum of 10 hours.
 - 5.6. The first time you boot your NDS, you will be requested to select the language. Select **English** and continue. Then, configure the username, date, time, and the following configuration options for the colours according to your own preferences and press to reboot the NDS when it requests it.
 - 5.7. After a few seconds of rebooting, a warning message with the NDS logo will appear. Press any button or touch the screen to skip it, and then the main menu will appear.
 - 5.8. Select the option to load the cartridge software (i.e., choose the uppermost option of the menu and press 'A') and the M3 or R4 software will start to load.
 - 5.9. After few seconds you will be able to see the M3 DS Real logo (for M3 cartridge) or R4iSDHC logo (for R4 cartridge) on the top screen of the NDS, and another menu will appear on the lower NDS screen. Select the first icon on the left of the first row. A simple file system navigator will appear.
 - 5.10. Look for the NDS folder (or Games if you are using R4i_SDHC_YMenu.zip), if needed, and the file of the game downloaded before. Choose it and select to load it in the slot 1 (option on your left for M3i, this option does not appear for R4).
 - 5.11. The game will be automatically downloaded from the cartridge and run.
 - 5.12. To finish the game, switch off the device.

In fact, the program that you have just downloaded and tested on the NDS is the one that will be gradually developed in the last weeks of this course. If everything has worked correctly until this point, your NDS and M3i Zero cartridge or R4 cartridge are both ready for the course!

