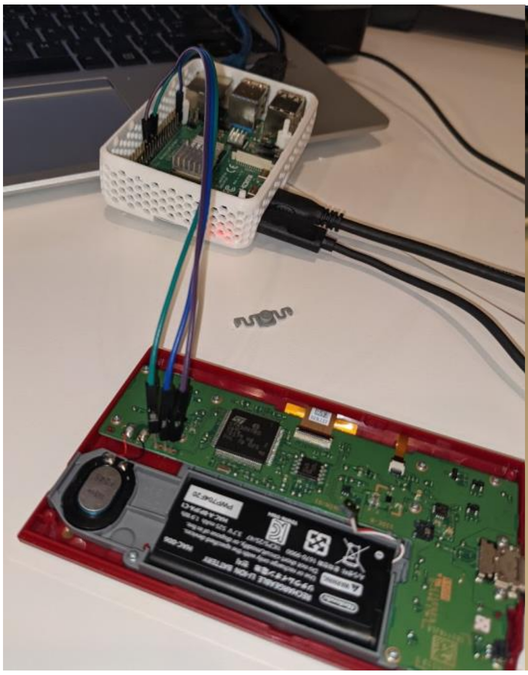
How to add games on Nintendo Game and Watch 2020.

No Soldering Raspberry pie only Guide.

For original 1MB flash

(based on Mickey`s guide)



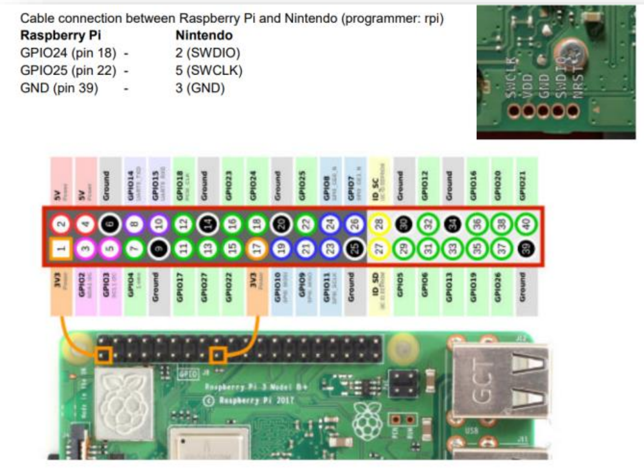
Disclaimer: this guide is for those who don’t have the right equipment, experience and time on hand. There are better and more professional guides on the internet.

Prerequisites.

1. Raspberry pi
2. Dupont cables.

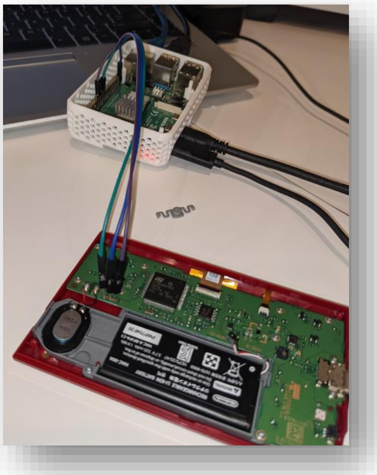
Step1: Open and Prepare your Game and Watch for flashing

1. Find suitable screw driver (does not have to be triangle)
2. Connect dupont cables using scheme



Cable connection between Raspberry Pi and Nintendo (programmer: rpi)

Raspberry Pi		Nintendo
GPIO24 (pin 18)	-	2 (SWDIO)
GPIO25 (pin 22)	-	5 (SWCLK)
GND (pin 39)	-	3 (GND)



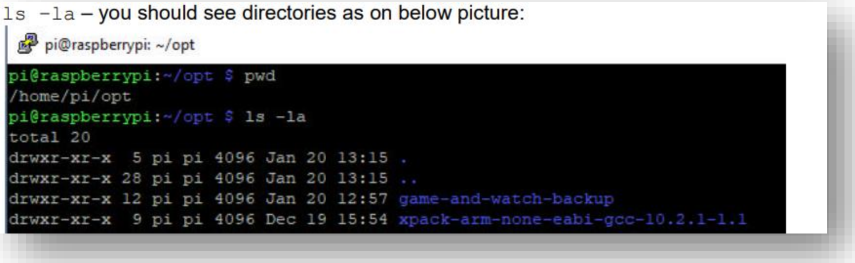
Step2 : Prepare your Raspberry.

1. Use Raspberry pi imaging tool to install Raspbian Lite on your SD.
2. Activate SSH on your Raspberry using Raspy-Config -> Connection.
    a. Use SSH on your PC to access Raspberry to be able to copy paste commands from this guide.

Step 3: Hack and Unlock your Game and Watch

1. sudo apt update
2. sudo apt upgrade
3. wget https://github.com/xpack-dev-tools/arm-none-eabi-gcc-xpack/releases/download/v10.2.1-1.1/xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-arm.tar.gz
4. mkdir -p ~/opt
5. cd ~/opt
6. tar xvf ../xpack-arm-none-eabi-gcc-10.2.1-1.1-linux-arm.tar.gz xpack-arm-none-eabigcc-10.2.1-1.1
7. export PATH=$PATH:/home/pi/opt/xpack-arm-none-eabi-gcc-10.2.1-1.1/bin/
8. git clone https://github.com/ghidraninja/game-and-watch-backup.git
9. sudo apt install npm
10. npm install --global xpm@latest
11. xpm install --global @xpack-dev-tools/openocd@latest

12. export OPENOCD="/home/pi/.local/xPacks/@xpack-dev-tools/openocd/0.11.0-1.1/.content/bin/openocd"

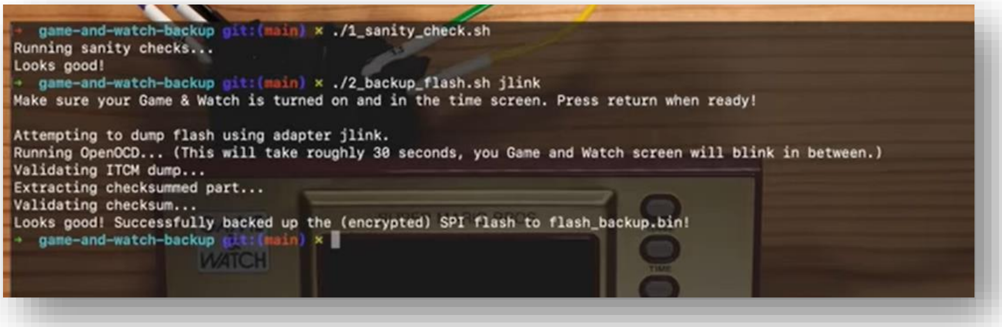


`ls -la` – you should see directories as on below picture:

pi@raspberrypi: ~/opt

```
pi@raspberrypi:~/opt $ pwd
/home/pi/opt
pi@raspberrypi:~/opt $ ls -la
total 20
drwxr-xr-x  5 pi pi 4096 Jan 20 13:15 .
drwxr-xr-x 28 pi pi 4096 Jan 20 13:15 ..
drwxr-xr-x 12 pi pi 4096 Jan 20 12:57 game-and-watch-backup
drwxr-xr-x  9 pi pi 4096 Dec 19 15:54 xpack-arm-none-eabi-gcc-10.2.1-1.1
```

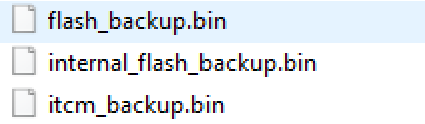
13. sudo apt-get install binutils-arm-none-eabi python3 libftdi1
14. cd game-and-watch-backup
15. ./ 1_sanity_check.sh (if you get error try pushing and holding dupont cables to make sure you have connection (or solder them)



```
→  game-and-watch-backup git:(main) × ./1_sanity_check.sh
Running sanity checks...
Looks good!
→  game-and-watch-backup git:(main) × ./2_backup_flash.sh jlink
Make sure your Game & Watch is turned on and in the time screen. Press return when ready!

Attempting to dump flash using adapter jlink.
Running OpenOCD... (This will take roughly 30 seconds, you Game and Watch screen will blink in between.)
Validating ITCM dump...
Extracting checksummed part...
Validating checksum...
Looks good! Successfully backed up the (encrypted) SPI flash to flash_backup.bin!
→  game-and-watch-backup git:(main) ×
```

16. ./ 2_backup_flash.sh rpi
17. ./3_ … rpi
18. Follow this video from minute 2:48 -> https://www.youtube.com/watch?v=-MzmoEFs0bQ&ab_channel=stacksmashing
19. Once you reach ./5_ step you should have 3 files in backup filed within folder game-and-watch-backup



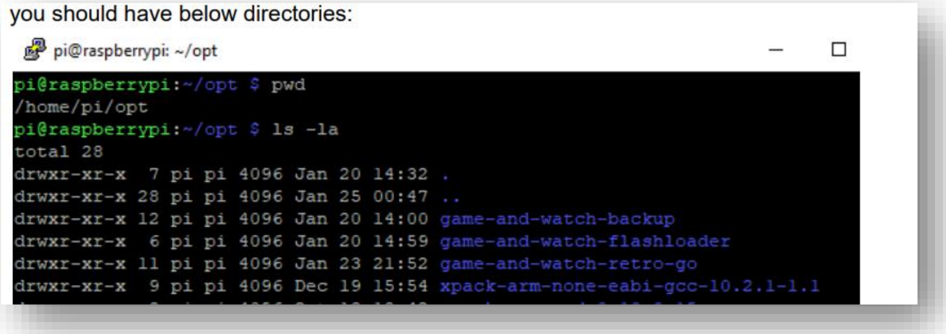
flash_backup.bin
internal_flash_backup.bin
itcm_backup.bin

20. Backup those files if not the whole folder game-and-watch-backup, you can use FileZilla on your Windows PC to access Raspberry pi and copy files from RPI to your PC. You can later use FileZilla to copy ROMS on RPI.

21. If something goes wrong later on you can come back to this folder and run 5_restore.sh script and restore original FW.

Step 4: Install Retro-Go

1. if you use 1MB original Flash chip this will replace original FW but you can always use ./5_restore.sh script to bring it back.
2. cd ..
3. cd opt
4. git clone https://github.com/ghidraninja/game-and-watch-flashloader.git
5. cd game-and-watch-flashloader
6. make GCC_PATH=/home/pi/opt/xpack-arm-none-eabi-gcc-10.2.1-1.1/bin/
7. cd ..
8. cd opt
9. git clone --recurse-submodules https://github.com/kbeckmann/game-and-watch-retro-go

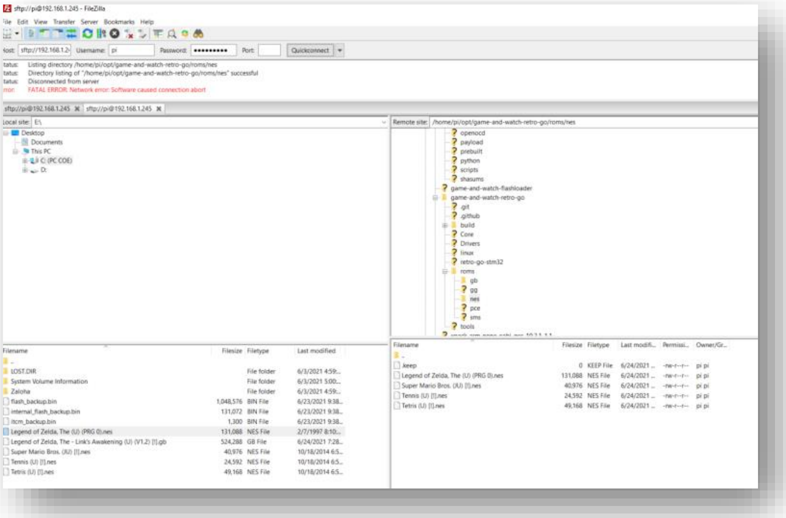


you should have below directories:

pi@raspberrypi: ~/opt

```
pi@raspberrypi:~/opt $ pwd
/home/pi/opt
pi@raspberrypi:~/opt $ ls -la
total 28
drwxr-xr-x  7 pi pi 4096 Jan 20 14:32 .
drwxr-xr-x 28 pi pi 4096 Jan 25 00:47 ..
drwxr-xr-x 12 pi pi 4096 Jan 20 14:00 game-and-watch-backup
drwxr-xr-x  6 pi pi 4096 Jan 20 14:59 game-and-watch-flashloader
drwxr-xr-x 11 pi pi 4096 Jan 23 21:52 game-and-watch-retro-go
drwxr-xr-x  9 pi pi 4096 Dec 19 15:54 xpack-arm-none-eabi-gcc-10.2.1-1.1
```

10.
11. Use FileZilla on your PC to copy rom into dedicated folder e.g. /home/pi/opt/game-and-watch-retro-go/roms/nes



sftp://pi@192.168.1.245 - FileZilla

Host: sftp://192.168.1.2 Username: pi Password: •••••••••• Port: Quickconnect

```
Status:	Listing directory /home/pi/opt/game-and-watch-retro-go/roms/nes
Status:	Directory listing of "/home/pi/opt/game-and-watch-retro-go/roms/nes" successful
Status:	Disconnected from server
Error:	FATAL ERROR: Network error: Software caused connection abort
```

sftp://pi@192.168.1.245 sftp://pi@192.168.1.245

Local site: E:\

Filename	Filesize	Filetype	Last modified
..			
LOST.DIR		File folder	6/3/2021 4:59:...
System Volume Information		File folder	6/3/2021 5:00:...
Zaloha		File folder	6/3/2021 4:59:...
flash_backup.bin	1,048,576	BIN File	6/23/2021 9:38...
internal_flash_backup.bin	131,072	BIN File	6/23/2021 9:38...
itcm_backup.bin	1,300	BIN File	6/23/2021 9:38...
Legend of Zelda, The (U) (PRG 0).nes	131,088	NES File	2/7/1997 8:10:...
Legend of Zelda, The - Link's Awakening (U) (V1.2) [!].gb	524,288	GB File	6/24/2021 7:28...
Super Mario Bros. (JU) [!].nes	40,976	NES File	10/18/2014 6:5...
Tennis (U) [!].nes	24,592	NES File	10/18/2014 6:5...
Tetris (U) [!].nes	49,168	NES File	10/18/2014 6:5...

Remote site: /home/pi/opt/game-and-watch-retro-go/roms/nes

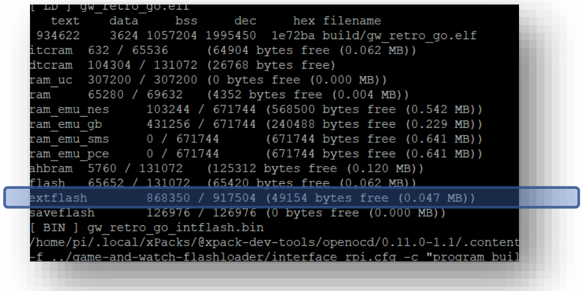
Filename	Filesize	Filetype	Last modifi...	Permissi...	Owner/Gr...
..					
.keep	0	KEEP File	6/24/2021 ...	-rw-r--r--	pi pi
Legend of Zelda, The (U) (PRG 0).nes	131,088	NES File	6/24/2021 ...	-rw-r--r--	pi pi
Super Mario Bros. (JU) [!].nes	40,976	NES File	6/24/2021 ...	-rw-r--r--	pi pi
Tennis (U) [!].nes	24,592	NES File	6/24/2021 ...	-rw-r--r--	pi pi
Tetris (U) [!].nes	49,168	NES File	6/24/2021 ...	-rw-r--r--	pi pi

12.
13. Sudo apt install lz4
14. cd game-and-watch-retro-go
15. export ADAPTER=rpi
16. export OPENOCD="/home/pi/.local/xPacks/@xpack-dev-tools/openocd/0.11.0-1.1/.content/bin/openocd"
17. make GCC_PATH=/home/pi/opt/xpack-arm-none-eabi-gcc-10.2.1-1.1/bin/ flash_all
18. Once compilation ends , HOLD power button if the flash process fails.
19. If you get failure, navigate to the folder game-and-watch-backup and run ./5_retrore.sh rpi to flash back original FW, or alternatively run command 17 above make GCC_PATH=… again.
20. I only got ~35% success with game-and-watch-retro-go as of 6/24/2021even though the connectivity works 100%. Try holding power button on the console while flashing, I found it could increase flashing success.

<u>How many games you can add?</u>

I managed to add 4 NES games: tetris, tennis, Mario1, Zelda 1 and1 GB game: Link Awakening (500kb) on 1MB chip.

The retro-go before flashing will show statistics and extflash line will tell you how much space you have left see below.



```
[ LD ] gw_retro_go.elf
   text    data     bss     dec     hex filename
 934622    3624 1057204 1995450  1e72ba build/gw_retro_go.elf
itcram  632 / 65536     (64904 bytes free (0.062 MB))
dtcram  104304 / 131072 (26768 bytes free)
ram_uc  307200 / 307200 (0 bytes free (0.000 MB))
ram     65280 / 69632   (4352 bytes free (0.004 MB))
ram_emu_nes     103244 / 671744 (568500 bytes free (0.542 MB))
ram_emu_gb      431256 / 671744 (240488 bytes free (0.229 MB))
ram_emu_sms     0 / 671744      (671744 bytes free (0.641 MB))
ram_emu_pce     0 / 671744      (671744 bytes free (0.641 MB))
ahbram  5760 / 131072   (125312 bytes free (0.120 MB))
flash   65652 / 131072  (65420 bytes free (0.062 MB))
extflash        868350 / 917504 (49154 bytes free (0.047 MB))
saveflash       126976 / 126976 (0 bytes free (0.000 MB))
[ BIN ] gw_retro_go_intflash.bin
/home/pi/.local/xPacks/@xpack-dev-tools/openocd/0.11.0-1.1/.content
-f ../game-and-watch-flashloader/interface_rpi.cfg -c "program buil
```