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RESEARCH ARTICLE

ARCADE PI THEME: RETRO DIGITAL GAMES

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Abstract

Currently for the most nostalgic in the world of games, playing a game title on the Super Nintendo on an original console is practically a rarity. There are alternatives on the internet to play on computers, but it is always necessary to take a computer or notebook to enjoy these games and we are not always able to take them to other places. This project intends to demonstrate how a classic game can be digitally preserved and show this retro gaming culture to younger people. All through a mini- microcomputer known as Orange PI - old digital games. It will address the functionality strategies and configurations of the system that will be installed on the console, hardware and software model and its components and equipment for such development. Soon after the introduction, some authors' thoughts on this project will be shown, their contribution to having a more in-depth look at classic games, which helped a lot in the development of the project.Its methodology details the construction of the Orange PI - old digital games, all these steps will be described in detail from its assembly to the allocation of the game's library in the console. Its result was very satisfactory, for what was wanted to develop, but this console can still be improved a lot.

Introduction:-

Nowadays, with the constant growth of technologies in the area of games, many of the cultures and old experiences are lost, such as retro games and also due to the difficulties of trying to preserve them, since in their development there are processes linked to legal documentation, controllers, platforms open and closed and in the way of extracting old media using specific tools, however this growth also makes it possible to develop games from the past using this new technology in an intuitive and low-cost way like old digital games. Despite the decline of arcades, classic games still add a lot of fun to users, however new video games with their modern platforms do not support these old versions, as they are not developed for this practice and have different hardware from classic games. Arcadi PI – old digital games was developed with this aim of gameplay, fun, knowledge for the youngest and so that this culture and stories of these games are not lost in oblivion. Its construction took place through an Orange PI which is a mini-microcomputermultiplatform single board, small the size of a credit card and low cost, have HDMI and USB interfaces, memory card slots, with processor and graphics processor, along with some software, plus some computing components including cables, power supplies and gamepad , with Linux system is an emulator that makes it possible to develop a prototyping platform for such a project. A library called RetrOrangePi was also used, from which some games were taken for the emulator.

We are talking about preserving classic games through game emulation, which is nothing more than keeping all your data, whatever it may be, in its original form, that is, this information must be kept unchanged. The original software

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must also be maintained for its execution, and it must run on the emulator's operating system, making this hardware as original as possible. Another very important thing to know is that emulation can occur at different levels: in software, operating systems and hardware (GUTTENBRUNNER; BECKER; RAUBER, 2010).

There is a lot of talk about the digital preservation of games, which is nothing more than keeping their digital data usable even after that original environment is no longer used. There were two strategies that helped a lot due to their evolution: migration and emulation. Migration is used as a strategy to convert information to more recent data, while emulation maintains the entire structure of information in its original state and recreates a final product of this digital object in a different format. Following the context of the subject, digital objects are all static, dynamic, and interactive contents. Exemplifying dynamic and interactive digital contents are interactive documents, video games, interactive art and processes and numerical analysis (GUTTENBRUNNER; RAUBER, 2012).

Arcade PI after some research, the Snes9x emulator was chosen, as it was the one that presented the best performance in the developed project and served to run game software and to manage games. Snes9x has a large library of games and is also free software, its main development and in order to allow the reproduction of game images designed for Super Nintendo Entertainment System (SNES). In addition to this information on its official website it informs that it is a work developed for more than three years not partially between encodings and recodings in hacking , coded in C++, it has three emulators of CPU assembler in the ports i386 in the system Linux, Windows, Android and IOS in the However, currently there are other ports that have been developed (KARIM SAID, SHAUN K. KANE, 2013).

Snes9x Emulator History

Speaking a little about its creation and its history, the SNES9X was developed and created by Gary Henderson and JerremyKoot, this was due to its two previous emulator models the Snes96 and Snes97. Due to this collaboration between the two, a unique and more powerful emulator was developed, the SNES9X emulator. This emulator allows its users to play some games like Super Mario Kart, Super Metroid and NBA Jam are some of its games. The SNES9X also has support for the Super Famicom (SFC), which would be the versions of the same in Japanese and that only played games available in Japan. The emulator has features such as fast forward games, image enhancement, online multiplayer and also includes video filters, being a fourth generation video game.

Figure 01:- You can see the game version of Super Mario World from 1990 and 1991.

Source: Super Mario World, Duhnascimento (2022).

Some of its file extensions are: Snes9x Slot 2 Save State (001), Super Nintendo ROM Save File (SRM), Super Nintendo Wild Card ROM File (SWC) and ZSNES Save File (ZST).For those who love old games and like the

feeling of picking up the controller and playing a game like Super Mario World as if they were on a real console and remembering those childhood moments are indescribable for people who like to play these games to describe this sensation. Much harder and these older people trying to explain to the younger ones how games were played in the old days. With that came Orange PI - vintage digital games, which is nothing more than a dual controller gaming console where people can play their old school games and show their children, grandchildren and other younger people what console gaming feels like. With that these games are remembered and do not fall into oblivion, because with each passing time and with the new technologies it is inevitable that people forget about the consoles that at one time were the best technology of their time, but that game lovers never forgot. The Orange PI - old digital games can also be developed in the academic areas of technologies as a way of developing students' projects.

Theoretical Reference

The project related to the subjects of this article was divided in order to bring knowledge about the previously mentioned themes, demonstrating the use that each topic can bring.

Materials And Methods:-

Orange Pi is an open source single board computer, a new generation of arm64 development boards, which can run operating systems such as Android TV 9.0, Ubuntu and Debian. The Orange Pi 3 LTS uses the Allwinner H6 chip and has 2GB LPDDR3 RAM memory.

Purpose of the Orange Pi 3 LTS

We can use it to build:

1. A small Linux desktop computer
2. A small Linux web server
3. Klipper host computer to control 3D printer
4. android tv box

The Orange Pi development board is not just a consumer product, it is designed for anyone who wants to use technology to create and innovate. It's a simple, fun, and useful tool you can use to shape the world around you.

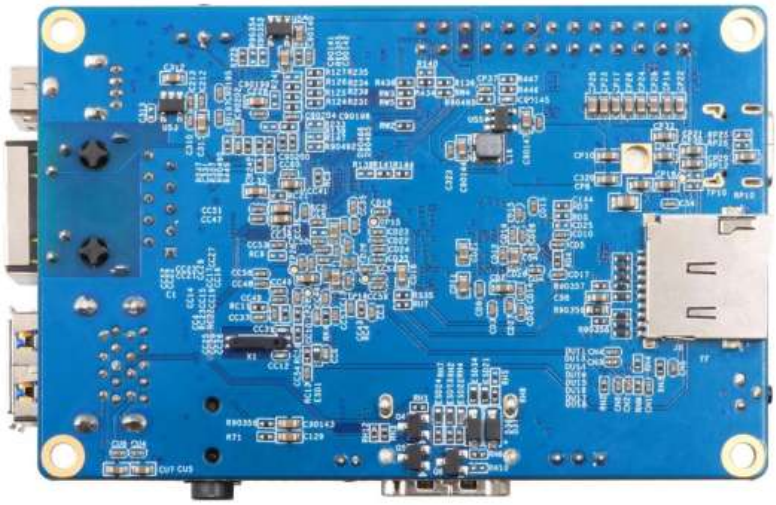
Table 1:- Orange Pi 3 LTS hardware features.

Introduction to hardware features	
cpu	Allwinner H6 quad -core 64-bit 1.8GHz high-performance Cortex-A53 processor
gpu	• High-performance multi-core GPU Mali T720 • OpenGL ES3.1/3.0/2.0/1.1
Memory	2GB LPDDR3(shared with GPU)
internal storage	TF card slot, 8GB EMMC
ethernet	YT8531C chip, Support 10/100M/1000M Ethernet
WIFI + Bluetooth	AW859Achip, Support IEEE 802.11 a/b/g/n/ac, BT5.0
video output	HDMI 2.0a, TV CVBS output
Audio Output	HDMI output, 3.5mm audio port
Power supply	USB Type-C power supply
power management unit	AXP805
USB Ports	1xUSB 3.0 HOST, 1xUSB 2.0 HOST, 1xUSB2.0 OTG
26 pin header	1xI2C,1xSPI, 1xUART and multiple GPIO
debug serial port	UART-TX, UART-RX and GND
led lights	Power indicator and status indicator
IR receiver	Infrared remote control for Orange Pi
Button	Power button (SW4)
OS support	Android9.0 TV, Ubuntu, Debian and Manjaro OS
Appearance	Product Size 85mm×56mm, Weight 45g

Figure 2:- Top view.

Source: Aliexpress (2022).

Figure 3:- Bottom view.



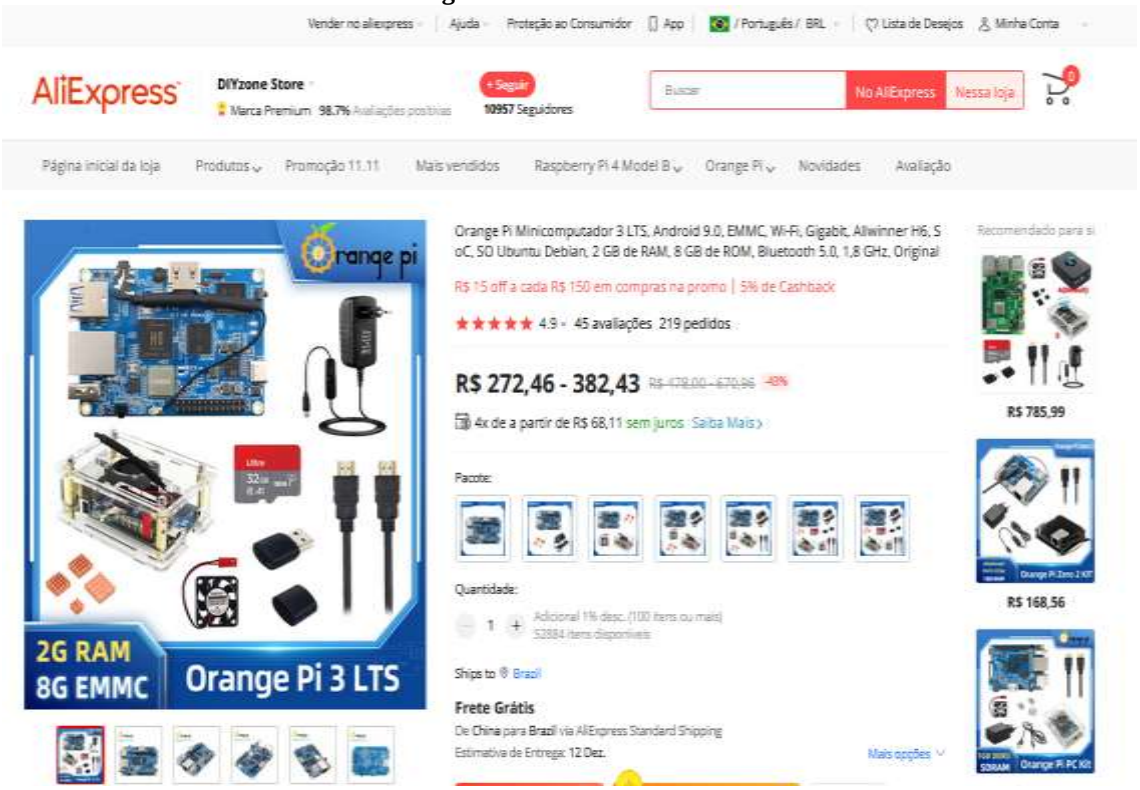
Source: Aliexpress (2022).

Figure 4:- 45º angle.

Source: Aliexpress (2022)

Buying process
Minicomputer :
Product link: https://pt.aliexpress.com/item/1005004072918799.html

Figure 5:- Purchase screen.



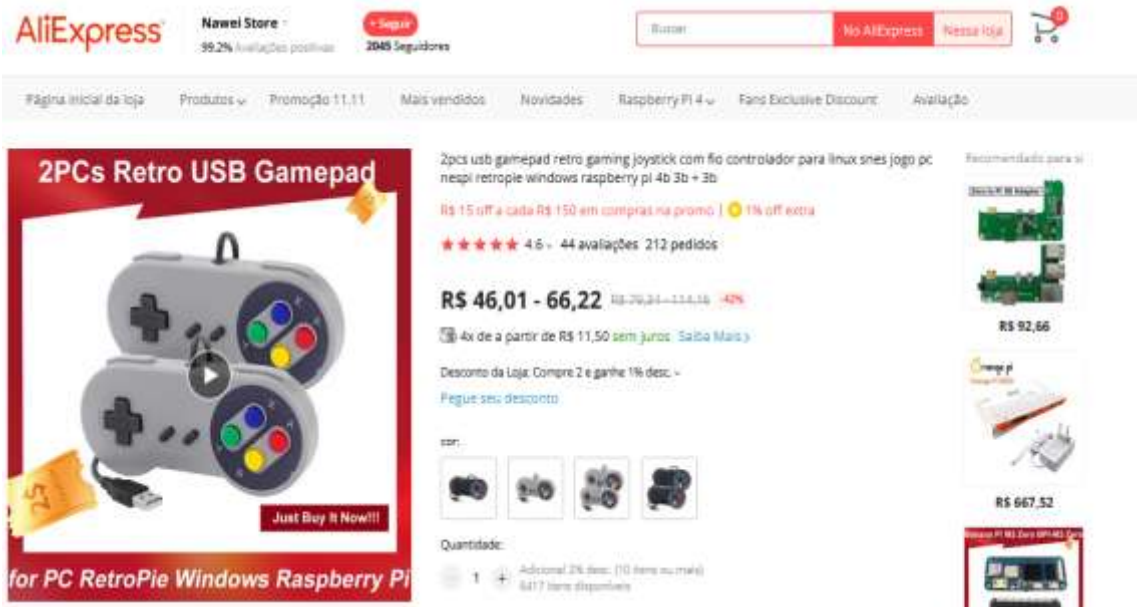
Source: Aliexpress (2022).

After choosing the option to purchase kit/package number 4:
1 x Orange PI 3 LTS
4 x copper heatsinks
1 x acrylic case
1 x cooling fan
1x source 5v 3a power adapter

Purchase value: BRL 328.44

Controls :
https://pt.aliexpress.com/item/1005002386364817.html
Purchase value: BRL 65.21

Figure 6:- Purchase screen.



Source: Aliexpress (2022)

To collect more details about Orange PI 3 LTS, follow Orange PI 3 LTS official website: http://www.orangepi.org/html/hardWare/computerAndMicrocontrollers/details/orange-pi-3-LTS.html

Link to download the image file (ISO) of the Ubuntu operating system for Orange PI 3 LTS: https://drive.google.com/drive/folders/1KzyzyByev-fpZat7yvgYz1omOqFFqt1k?usp=sharingOrangepi3-lts_3.0.8_ubuntu_jammy_desktop_xfce_linux5.16.17

The assembly process was an easy procedure. Just fit the pieces together and then tighten the screws:

Figure 7:- Ready project.

Ubuntu operating system installation process.

1) After downloading the ISO image of Ubuntu, it is necessary to install the application balenaEtcher, connect the 32 GB SD card to a computer, select the path where the ISO file is and wait for the recording.

Figure 8:- Program screen.

Wait to complete recording

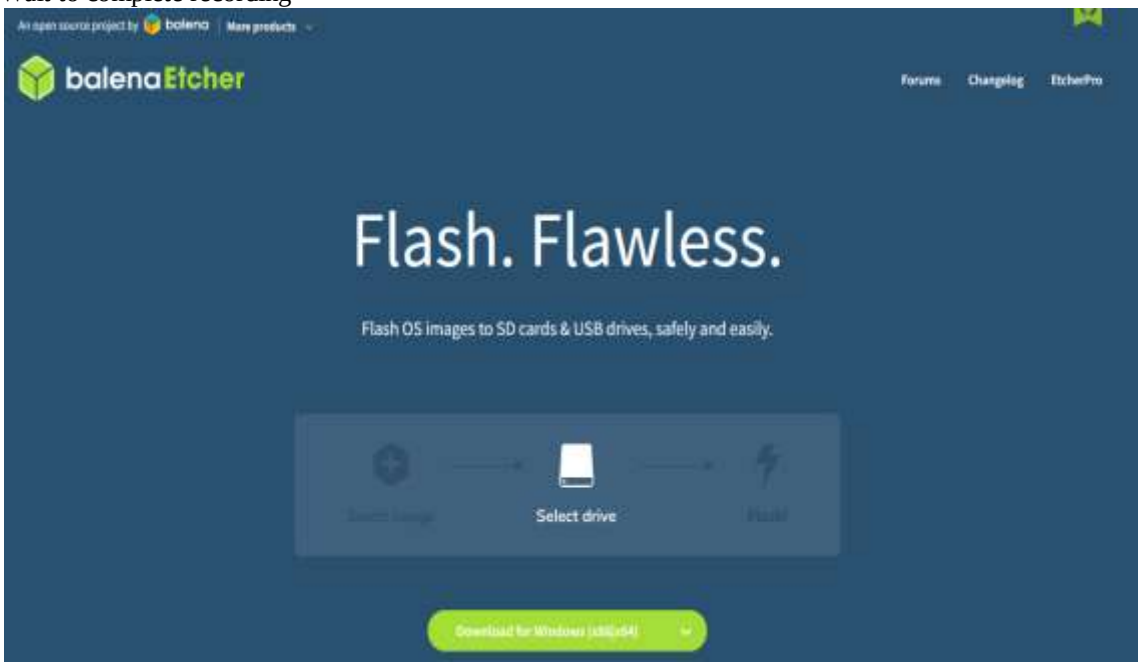
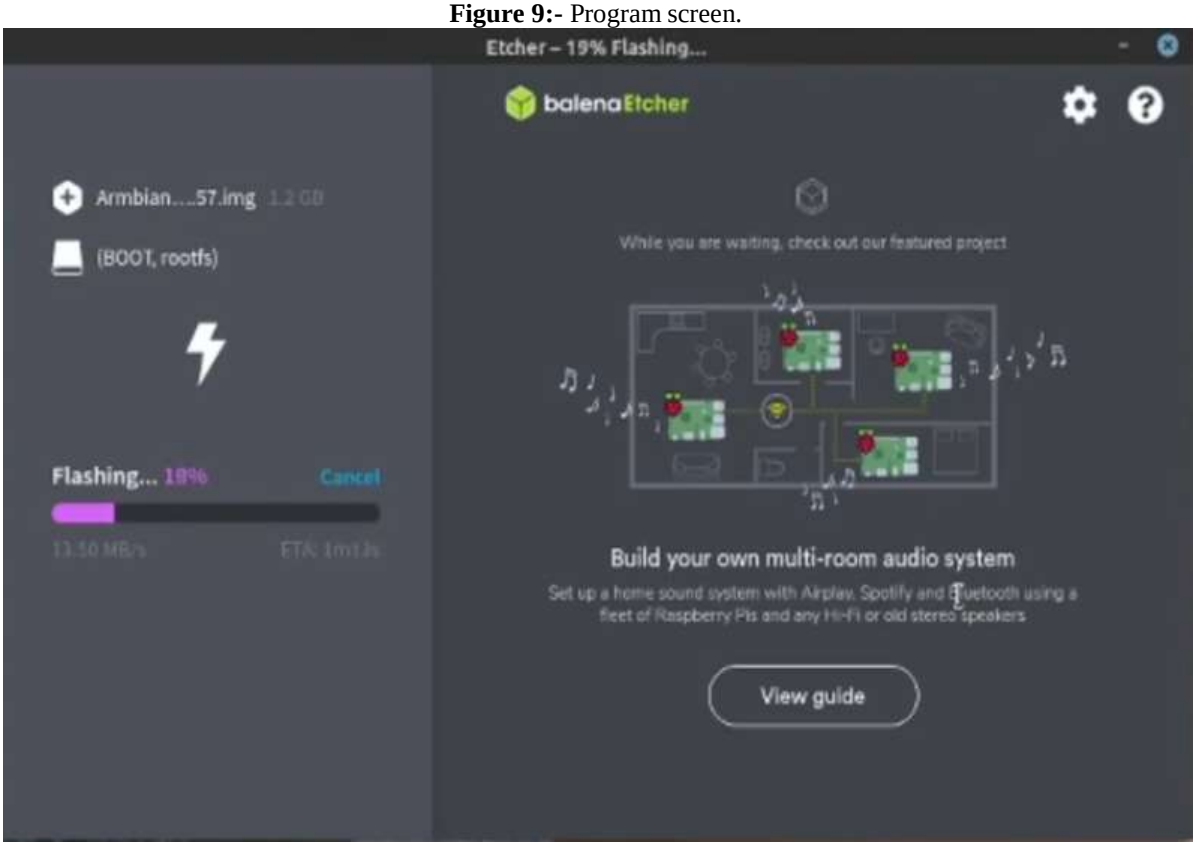
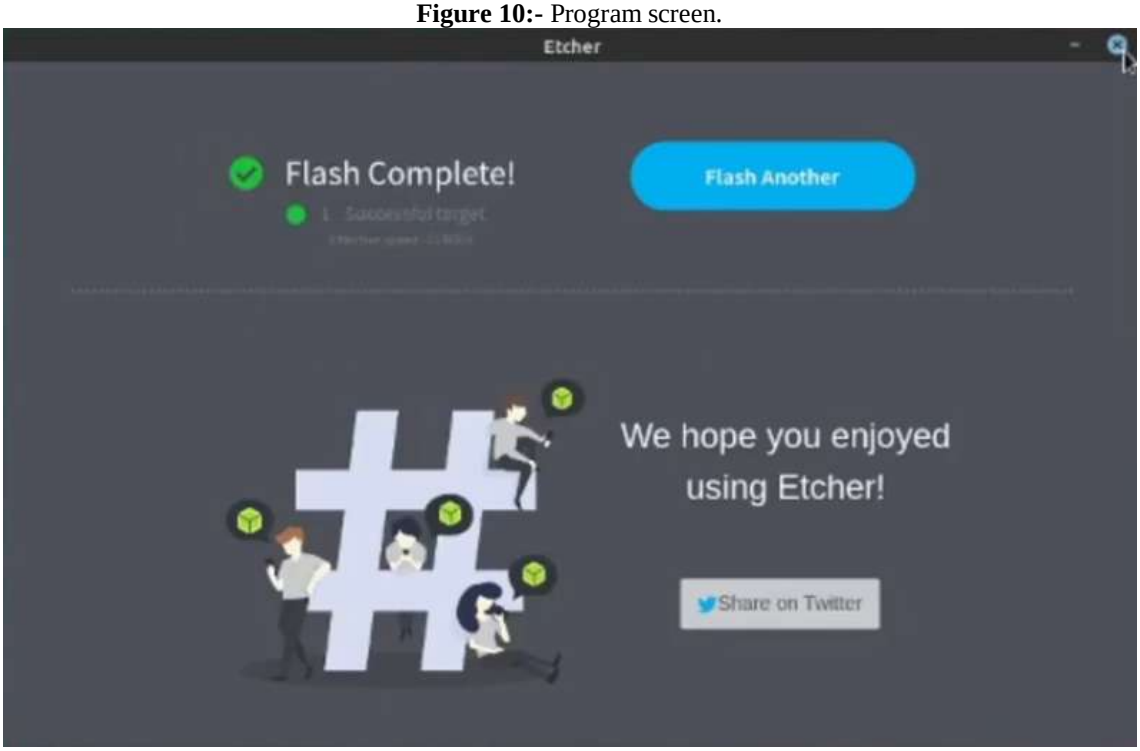


Figure 9:- Program screen.



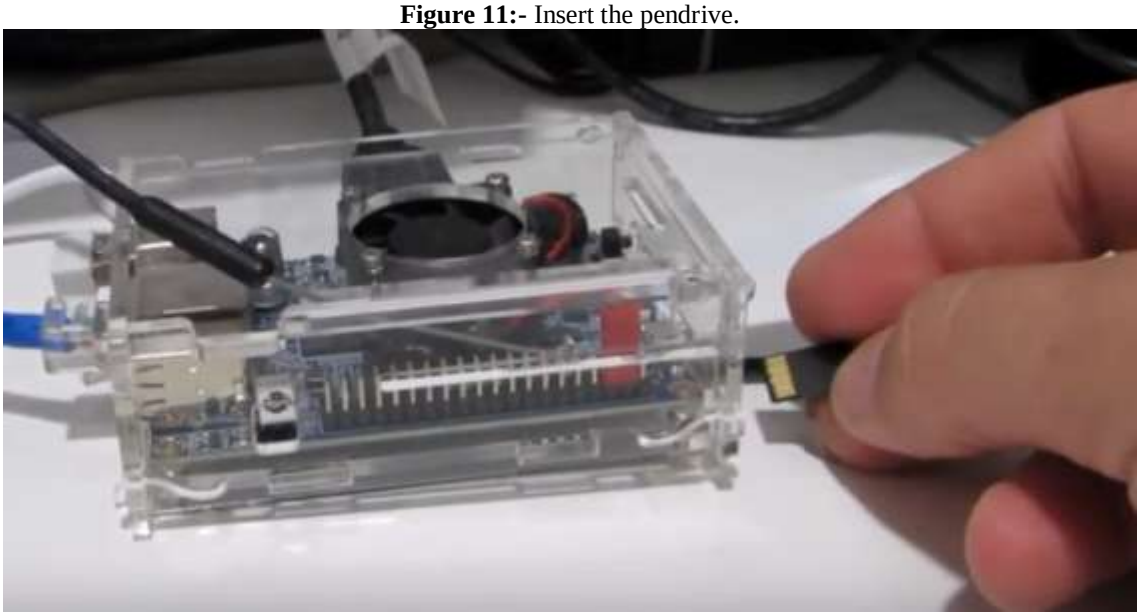
Wait until the message Flash Complete!

Figure 10:- Program screen.



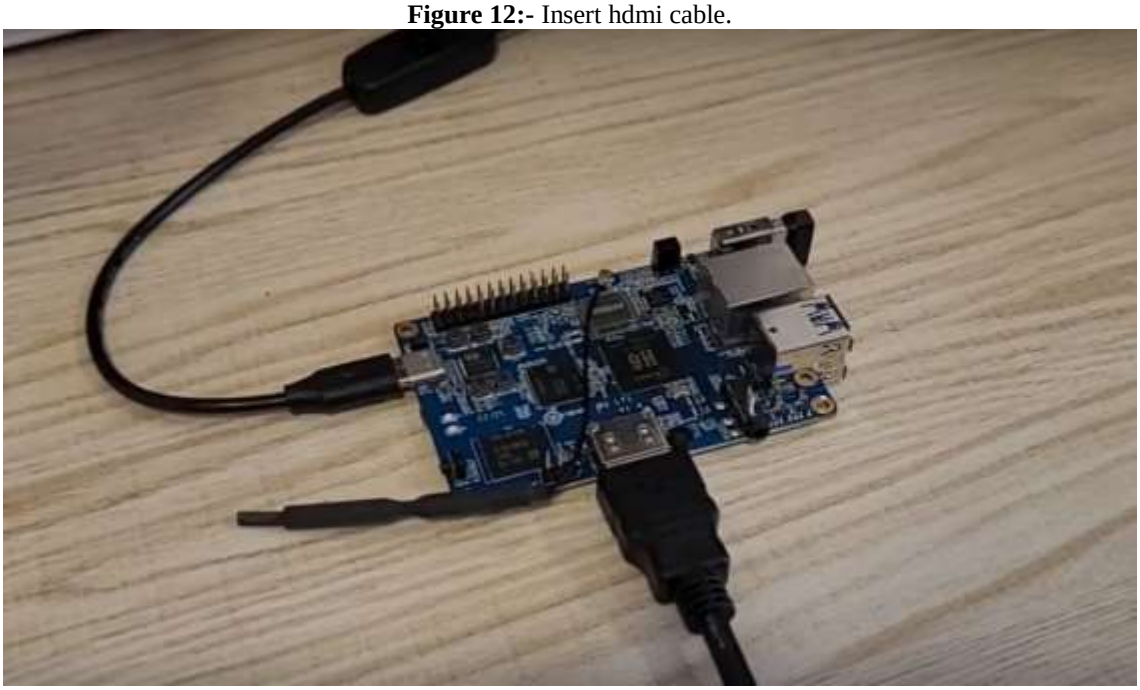
After recording on the micro SD card, it is inserted into the Orange PI 3 LTS

Figure 11:- Insert the pendrive.



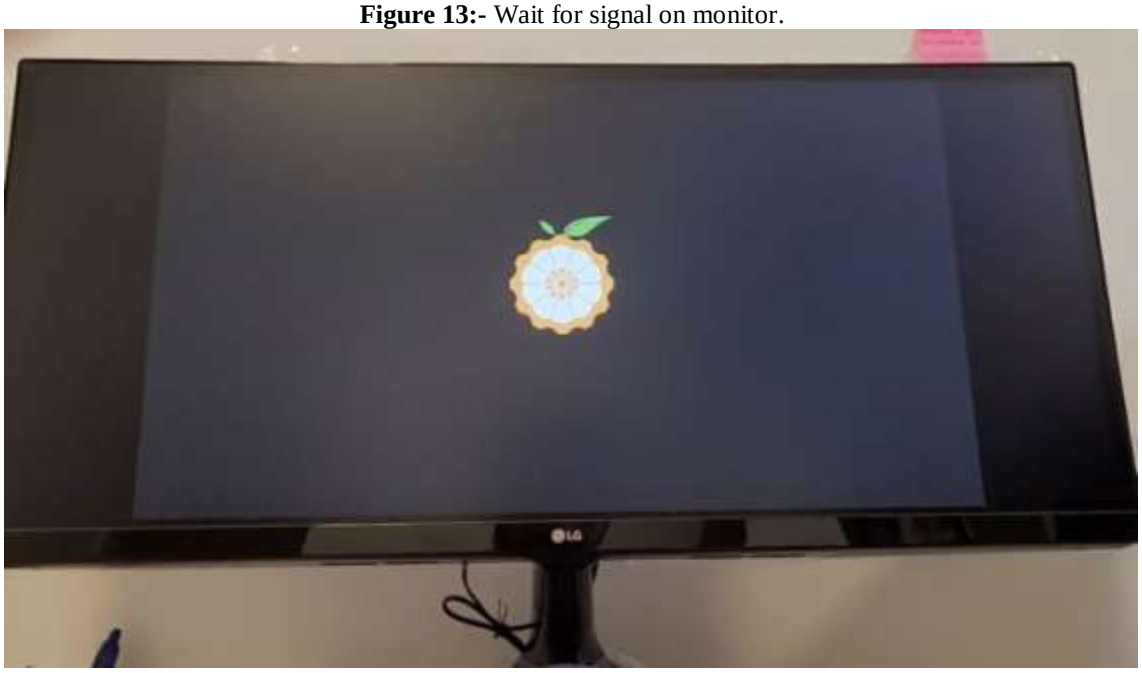
Then we connect the source, the HDMI video cable, keyboard and mouse:

Figure 12:- Insert hdmi cable.



We wait for the signal on the monitor:

Figure 13:- Wait for signal on monitor.



Snes9 emulator installation process

To install the Super Nintendo Snes9x emulator on Linux via Flatpak we need to have support for this technology installed on the system. So first we must install Flatpak .

Step 1. We open a terminal, preferably as administrator (root);

Step 2. We add the program repository with this command:

sudo add-apt-repository ppa:alexlarsson / flatpak

Step 3. We update the package manager with the command:

sudo apt-get update

Step 4. Now we use the command below to install the program;
sudo apt install -- install-recommends flatpak
How to Use Flatpak on Linux

Flatpak support installed in the distribution, we updated the repositories of its management, for that, we executed the command in the terminal. For example:
flatpak remote-add gnome https://sdk.gnome.org/gnome.flatpakrepo

After that, just install the application. For this, there are several commands, but the simplest way to install is by indicating the url of the reference file, provided by the desired application.

Flatpak is installed; we can install the Super Nintendo Snes9x emulator on Linux via Flatpak, doing the following:
Step 1. We open a terminal;
Step 2. We use the command below to install the program via Flatpak . In this part we must be patient, as it can often take several minutes for Flatpak to download everything it needs;

flatpak install – from https://flathub.org/repo/appstream/com.snes9x.Snes9x.flatpakref

Step 3. To update the program, when a new version is available, execute the command:

flatpak -- user update com.snes9x.Snes9x

Step 4. And if you need to uninstall the program, run the following command in the terminal:

flatpak -- user uninstall com.snes9x.Snes9x

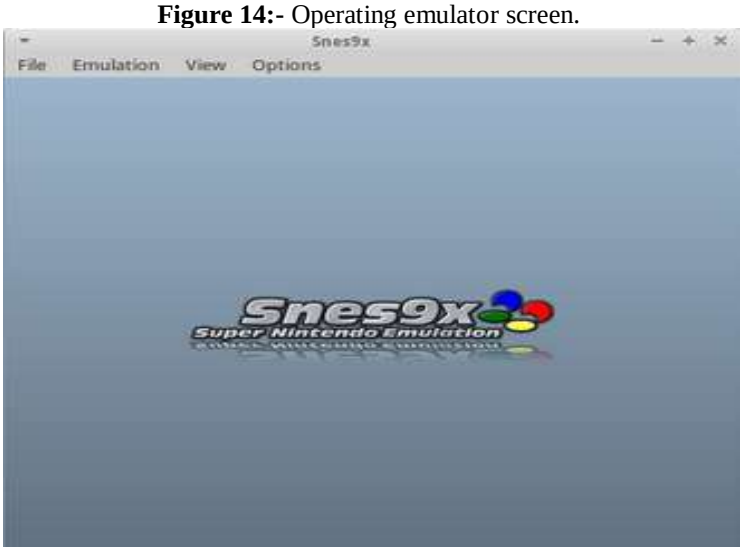
Preparing and running the Super Nintendo Snes9x emulator for the first time. Before running the emulator, we create a Snes9x folder on the desktop. Afterwards, we download a Super All Star ROM, and save it in the created folder.

Ready! Now, when we want to start the program, we type snes9x folder/ romimagename in a terminal, followed by the TAB key (replace "folder/ romimagename " with the path and name of the ROM).

Now, when we want to start the program, we type flatpak run com.snes9x.Snes9x in a terminal.

Once installed, we can launch the application from the menu or from the system applications panel by searching for "snes9x".

Figure 14:- Operating emulator screen.

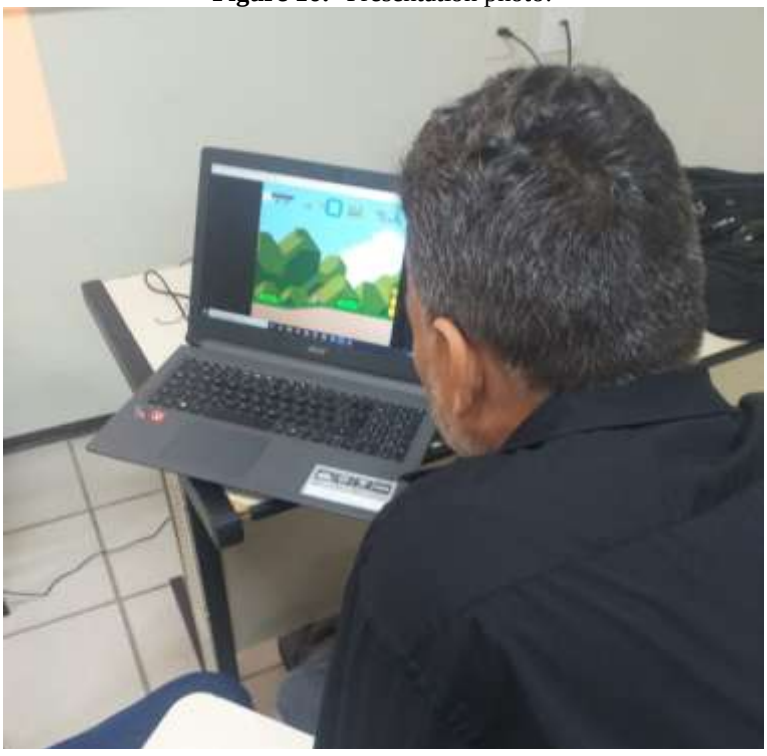


Presentation on October 26, 2022.

After completing the installation of the operating system and the Snes9x emulator, we presented our project to Professor Jean in practice.

Figure 15:- Presentation photo.

Figure 16:- Presentation photo.



Discussions And Results:-

The results were satisfactory presented in the presentation. We use the structure of the college as Datashow and the institution's Wi-Fi network. The Orange Pi worked perfectly, using both joysticks. Plugged in power cords, HDMI cable, keyboard and mouse. The system loaded normally, and the emulator with the ROM in the same way. We tested the controls, listened to the audio and it had great gameplay,

Final Considerations

After much research and development of the project, it was observed that old games with all the good memories kept in people's memories of that time, it becomes essential not to be part of their culture, as it was part of their lives . With that in mind, the Orange PI - old digital games becomes a great console to remember this time that brought so much joy to many, serving as a way of not forgetting these games, because people can have the same sensations as before and also show the youngest who never felt the pleasure of playing on an old console. It can also be developed in the area of technology education, because it becomes an excellent project to do with students and thus show even more about this idea. Therefore, Orange PI - old digital games becomes a great option both for the purposes of old games with all this cultural environment of not forgetting and their memories kept and for the development of projects in student areas, adding more knowledge and values to students and others.

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