

DIY Arcade Cabinet

A CS Summative Project

ICS20I

By: Chetan Mandur



What My Project Is

- Bartop Arcade Machine
- Has the ability to play thousands of retro games
- Designed with fighting games in mind
- (In supported games) It can be played with 2 players (more can be added with controllers)

What I Needed To Research

- How to work with a Raspberry Pi
- How to run emulators on a Raspberry Pi
- How to wire up Arcade buttons for it to work with a Raspberry Pi
- Where to buy a Raspberry Pi
- Where to buy arcade buttons/joysticks



How I did it (Materials)

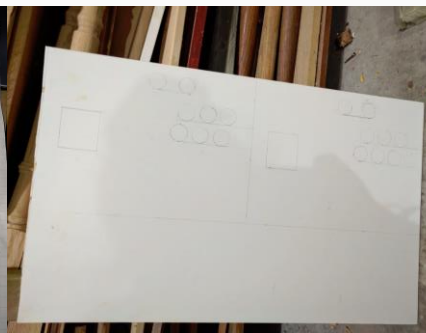
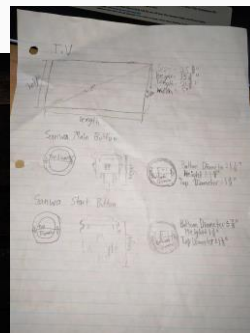
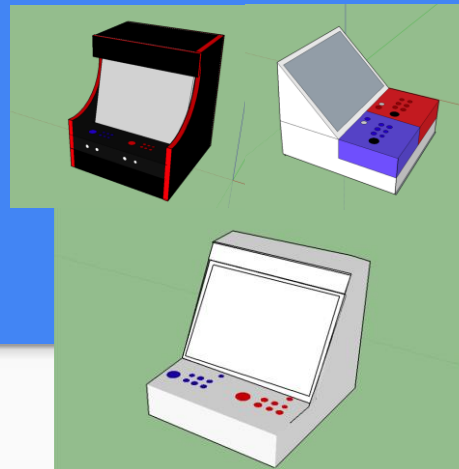


- A Raspberry Pi 3b (Bought in a kit from Amazon) used to run everything
- 2 full sets of arcade grade Sanwa buttons and joysticks (Bought from FocusAttack)
- 2 Zero Delay PC/PS3 PCBs (Bought from FocusAttack)
- A Cheap TV (Bought from Bestbuy)
- Some wood
- A Fan
- A power strip



How I did it (Steps - Part 1)

- I first installed RetroPie onto my Pi (I also overclocked my Pi)
- I took measurements of each part (TV, buttons, etc)
- I used a SketchUp (a 3D modeler) to make a rough design
- Made rough layout of button layout
- I gathered all the wood and used my measurements to get an idea of how everything will turn out

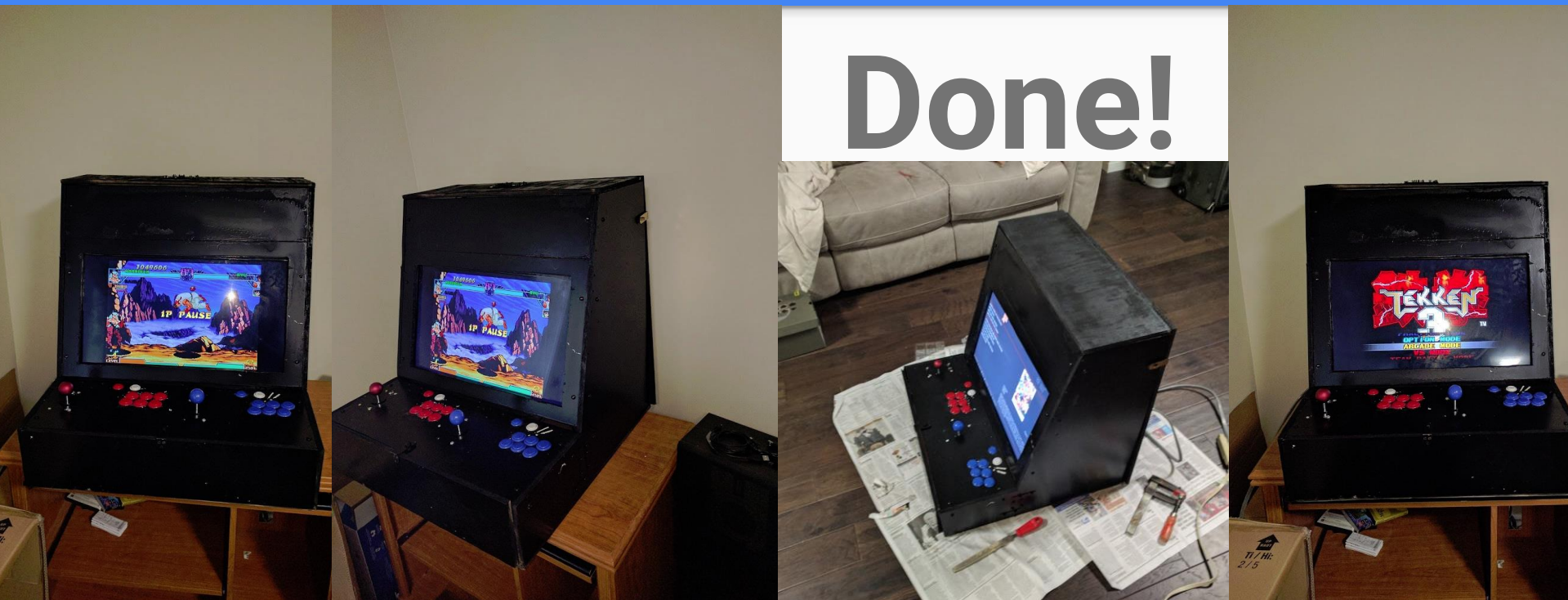


How I did it (Steps - Part 2)

- I began cutting all the wood on the lines I had drawn on
- I glued + nailed the main pieces and then spray painted it all down with black spray paint
- Finishing touches to cabinet (2nd layer of spray paint)
- Inserted buttons
- Placed all the components in



How I did it (Steps - Part 3)



What I've Learned

- Basics of working in Linux
- How to get around in RetroPie/how it works (basic level)
- What is abandonware
- How to overclock an Raspberry Pi
- How to wire up a set of arcade buttons
- Raspberry Pi is not very user friendly
- Raspberry Pi is very fragile

```
#uncomment to overclock the arm. 700 MHz is the default.
arm_freq=1100
gpu_freq=500
core_freq=500
over_voltage=3
sdram_freq=500
sdram_schmoo=0x02000020
sdram_over_voltage=2
```

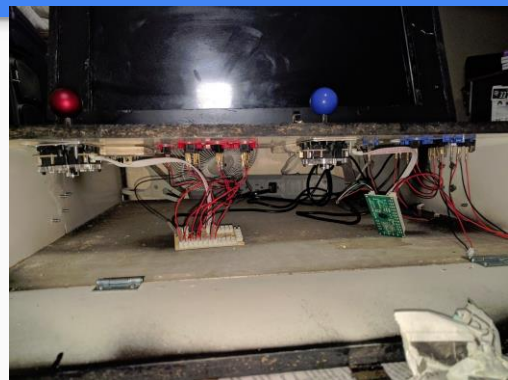
Sources:
https://www.reddit.com/r/gaming/comments/52b6t/are_ps1_games_considered_abandonware/
<https://en.wikipedia.org/wiki/Abandonware>
https://en.wikipedia.org/wiki/Retrogaming#Legal_issues_surrounding_retrogaming

Definition:

Abandonware is a product, typically software, ignored by its owner and manufacturer, and for which no product support is available. Although such software is usually still under copyright, the owner may not be tracking or enforcing copyright violations. (*Wikipedia*)

Is it legal to download abandonware for free?:

The legality of things is in a grey area. While the game maybe unsupported and/or discontinued, the owner (in most cases) has copyright of the game. Now, just because the owner has copyright of the game, doesn't mean that any legal action will happen for copies downloaded for free. For example, after Windows XP became discontinued in 2014 people took the OS and uploaded it to archive websites. Microsoft took no legal action towards the uploaders because, in their eyes it is a waste of money to go after people who are using software, that you have discontinued, for free.



The programs included with the Debian GNU/Linux system are free software; the exact distribution terms for each program are described in the individual files in `/usr/share/doc/*/*copyright`.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent permitted by applicable law.
Last login: Sun Jan 15 18:20:43 2017

```
***
***      Sunday, 15 January 2017,  9:04:04 pm UTC
***      Linux 4.4.26-v7+ armv7l GNU/Linux
***

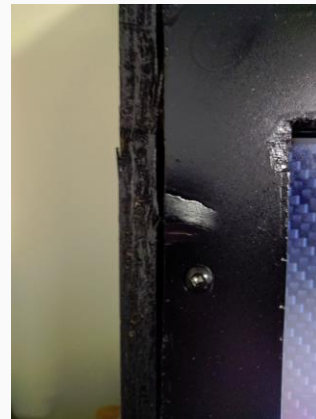
Filesystem      Size  Used Avail Use% Mounted on
/dev/root        29G  4.5G   24G   17% /
Uptime.....  0 days, 00h10m53s
Memory..... 609804kB (Free) / 752860kB (Total)
Running Processes.. 126
IP Address..... 192.168.0.11
Temperature..... CPU: 39°C/102°F GPU: 39°C/102°F
The RetroPie Project, https://retropie.org.uk
```

```
pi@CHETANS-BABYPi:~ $ sudo /home/pi/RetroPie-Setup/retropie_setup.sh
```


What Didn't Work/Problems

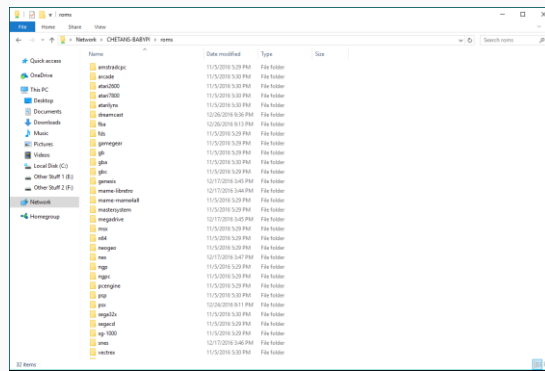
- 2 problems caused the Pi not to work properly
- The Pi wasn't powerful enough to run an emulator at a desired frame rate
- Overclock was unstable
- Pi was getting too hot ($\sim 70^{\circ}\text{C}$) while playing games
- Woodworking errors

```
#uncomment to overclock the arm. 700 MHz is the default.  
arm_freq=1100  
gpu_freq=500  
core_freq=500  
over_voltage=3  
sdram_freq=500  
sdram_schmoo=0x02000020  
sdram_over_voltage=2
```



Coollest/Most Interesting Parts

- All handmade from scratch, feels nice to see something you worked on finished
- Can hold thousands of games, preserve older games
- Games can be installed remotely
- Installed games are automatically configured
- Looks like an arcade cabinet



Emulator

- 3do
- Amiga
- Amstrad CPC
- Apple II
- Atari 2600
- Atari 5200 and 8 bit series
- Atari 7800
- Atari Jaguar
- Atari Lynx
- Atari ST/STE/TT/Falcon
- CoCo
- Colecovision
- Commodore 64
- Daphne
- Dragon 32
- Dreamcast
- FinalBurn Alpha
- GameCube
- Game & Watch
- Game Gear
- Game Boy
- Game Boy Color
- Game Boy Advance
- Intellivision
- Macintosh
- MAiME
- Master System
- Megadrive/Genesis
- MESS
- MSX
- Nintendo 64
- Nintendo DS
- Nintendo Entertainment System
- Neo Geo
- Neo Geo Pocket
- Neo Geo Pocket Color
- Oric-1/Atmos
- PC
- PC Engine/TurboGrafx-16
- PSP
- PlayStation 1
- PlayStation 2
- ResidualVM
- SAM Coupé
- Saturn
- ScummVM
- Sega 32X
- Sega CD
- Sega SG-1000
- Super Nintendo Entertainment System
- TI-99/4A
- TRS-80
- Vectrex
- Videopac/Odyssey2
- Virtual Boy
- Wii
- WonderSwan
- WonderSwan Color
- Zmachine
- ZX Spectrum

Thank you for
listening