Raspberry Pi Arcade

Knox Game Design November 2020 Levi D. Smith

First Build

- 2014, 2016
- Raspberry Pi 1 Model B
- Joystick and four buttons











Basics

- Five wires connect to the joystick (up, down, left, right, ground)
- Two wires connect to each button (button, ground)
- Ground wires can be combined together
- Install operating system onto Raspberry Pi
- Install / configure software to convert joystick/button inputs into key presses



Second Build

- Summer 2019
- Raspberry Pi
 3 Model B
- Joystick and six buttons













First Step

 Get everything working using keyboard before trying to get joystick / button controls working



Components

- Cookie tin case
- Joystick
 - https://www.adafruit.com/product/480
- Buttons
 - https://www.adafruit.com/product/474
- Jumper Wires (40x12")
- 5V 1A USB port power supply and cable
- Heat shrink tubing
- Screw / nuts to hold joystick





Tools

- Drill
 - Bits
 - 1" circle hole drill
- Heat gun
- Soldering iron or electrical tape
- Wire stripper / cutter















Equipment

- PNY USB Hub combo
 - Copy operating system image onto SD / Micro SD card



Software

- RetroPie / Raspian Operating system and game software
 - https://retropie.org.uk/download/
- Etcher Copies and installs ("flashes") operating system image onto Raspberry Pi
- Retrogame converts button presses and joystick movements into keystrokes
- raspi-config enable Wi-Fi and set keyboard layout
- ifconfig get IP address for SSH



GPIO Numbering



PIN 29-GPIO5 290 GPIOS K-is supposed tobe s 2x2 USBA 4+6 will always reset Ethernet Out Port 3.5mm Audio and Composite Output Jack CSI Camera Connector 1

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Configuring Retrogame

- Run sudo bash retrogame.sh to install and configure
- Executable
 - /usr/local/bin/retrogame
 - /etc/rc.local is updated to execute retrogame on startup
- Configuration
 - /boot/retrogame.cfg
 - Map joystick directions and buttons to GPIO numbers

2) a GPIO pin number; when grounded, will simulate corresponding # Uses Broadcom pin numbers for GPIO. # If first element is GND, the corresponding pin (or pins, multiple # given) is a LOW-level output; an extra ground pin for connecting # A '#' character indicates a comment to end-of-line. # File can be edited "live," no need to restart retrogame!
Here's a 6-button configuration:
#LEFT 10 # Joypad left #BIGHT 22 # Joypad left
#UP 23 # Journad um
#DOWN 27 # Journad down
#LEFTCTRL 4 # 'A' button
#LEFTALT 25 # 'B' button
#GND 6 30 # Spare ground point for 'Y' button #SPACE 16 # 'Select' button #ENTER 26 # 'Start' button #ESC 16 26 # Hold Start+Select to exit Rom
<pre>#L 10 # Joypad left #R 22 # Joypad right #U 23 # Joypad up #D 27 # Joypad down #A 32 # 'A' button #B 25 # 'B' button #C 5 # 'Y' button #A 5 #B 14 #L 14</pre>
LEFT 2 RIGHT 3 UP 4 DOWN 14
#A 15
#B 17 #X 18
#Y 27
D 15
S 17
A 27
ENTER 22 SPACE 22
#LEFIBRACE 23
ESC 23.22

Lessons Learned

- Only need to drill hole big enough for the shaft of the joystick (the ball screws off)
- How to make hole for HDMI and power cables without sharp edges?
- Avoid letting wires/connectors touch tin, or it will short out
- People will abuse it like a real arcade stick
- Difference between pin numbers and GPIO numbers
- Heat shrink tubing is great
- Old Raspberry Pi uses SD cards, new Raspberry Pi uses Micro SD



Lessons Learned

- Enable SSH to copy files to Raspberry PI
- Soldering use soldering iron to heat wires, then apply solder on top
- Need to mount Raspberry Pi onto case with (shorter) screws
- Default username/password pi / raspberry (change it)
- First build runs Raspian with graphical interface (can run Scratch 1 games); Second build has no graphical windowing system
- Emulation
 - No L / R buttons (for SNES)
 - Hold Start + Select to exit



SSH / SFTP

🧬 pi@retropie: ~

🚰 pi@192.168.1.15's password:

Linux retropie 4.19.50-v7+ #896 SMP Thu Jun 20 16:11:44 BST 2019 armv71

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: Sat Jun 13 09:17:19 2020

	- F	2020/ 00110	1.01				
***** Linux 4	Linux 4.19.50-v7+ armv71 GNU/Linux						
<pre>[*] Filesys</pre>	stem Size	Used Avail	Use% Mounted on				
* /dev/rd	oot 30G	2.5G 26G	9% /				
* Uptime.							
*******@@** Running							
`*****@@**' IP Addı							
The Ret	roPie Project,	https://ret	cropie.org.uk				

i@retropie:~ \$

🔁 Raspberry Pi - sttp://pi@192.168.1.15 - FileZilla												
File Edit View Transfer Server Bookmarks Helo												
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Host: 192.168.1.15 Username:	Password:	Port:		Quickconnect								
Status: Retrieving directory /home/pi/Ret Status: Listing directory /home/pi/Ret Status: Directory listing of "/home/pi/Ret Status: Retrieving directory listing of "/ Status: Listing directory /home/pi/Ret Directory listing of "/home/pi/Ret Status: Directory listing of "/home/pi/Ret	home/pi/RetroPie" oPie LetroPie" successful home/pi/RetroPie/roms" oPie/roms RetroPie/roms" successful								~			
Local site: D:\			~	Remote site: /home/pi/RetroPie/roms					~			
Decktop Decuments this PC Overlass SECVCLE.BIN Develoads o SECVCLE.BIN Develoads o android develoads android			•	stati800.cfg cache config c					~			
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				neogeo		File folder	7/3/2019 4:31:1	drwxr-xr-x				
SRECYCLE.BIN	File folder	10/8/2019 12:39:32		nes		File folder	6/13/2020 4:08:	drwxr-xr-x				
Downloads	File folder	11/18/2020 5:09:41		ngp		File folder	7/3/2019 4:31:1	drwxr-xr-x				
iso	File folder	9/27/2020 9:25:11		ngpc		File folder	7/3/2019 4:31:2	drwxr-xr-x				
	File folder	11/12/2020 8:13:16		- pcengine		File folder	7/3/2019 4:31:2	drwxr-xr-x				
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Oculus	File folder	11/18/2020 5:23:40		sega32x		File folder	7/3/2019 4:33:0	drwxr-xr-x				
Program Files	File folder	9/27/2020 8:59:50		segacd		File folder	7/3/2019 4:32:0	drwxr-xr-x				
Program Files (x86)	File folder	8/15/2020 5:12:28		sg-1000		File folder	7/3/2019 4:32:0	drwxr-xr-x				
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root@retropie:~# ifconfig eth0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500 ether b8:27:eb:e6:2d:ad txqueuelen 1000 (Ethernet) RX packets 0 bytes 0 (0.0 B) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 0 bytes 0 (0.0 B) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0 lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536 inet 127.0.0.1 netmask 255.0.0.0 inet6 ::1 prefixlen 128 scopeid 0x10<host> loop txqueuelen 1000 (Local Loopback) RX packets 8 bytes 480 (480.0 B) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 8 bytes 480 (480.0 B) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0 wland: flags=4163<UP,BROAD AST,RUNNING,MULTICAST> mtu 1500 inet 192.168.1.15 netmask 255.255.255.0 broadcast 192.168.1.255 inet6 fe80::dfc=___243:bc66:8ca prefixlen 64 scopeid 0x20<link> RX packets 562 bytes 89400 (87.3 KiB) RX errors 0 dropped 0 overruns 0 frame 0 TX packets 164 bytes 19668 (19.2 KiB) TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0 root@retropie:~# DESIGN

References

- My posts from my first Raspberry Pi Arcade
 - https://levidsmith.com/my-raspberry-pi-arcade/
 - https://levidsmith.com/raspberry-pi-arcade-update/
- Retro Gaming with Raspberry Pi (Adafruit)
 - https://learn.adafruit.com/retro-gaming-with-raspberry-pi/overview

