

Raspberry Pi Arcade

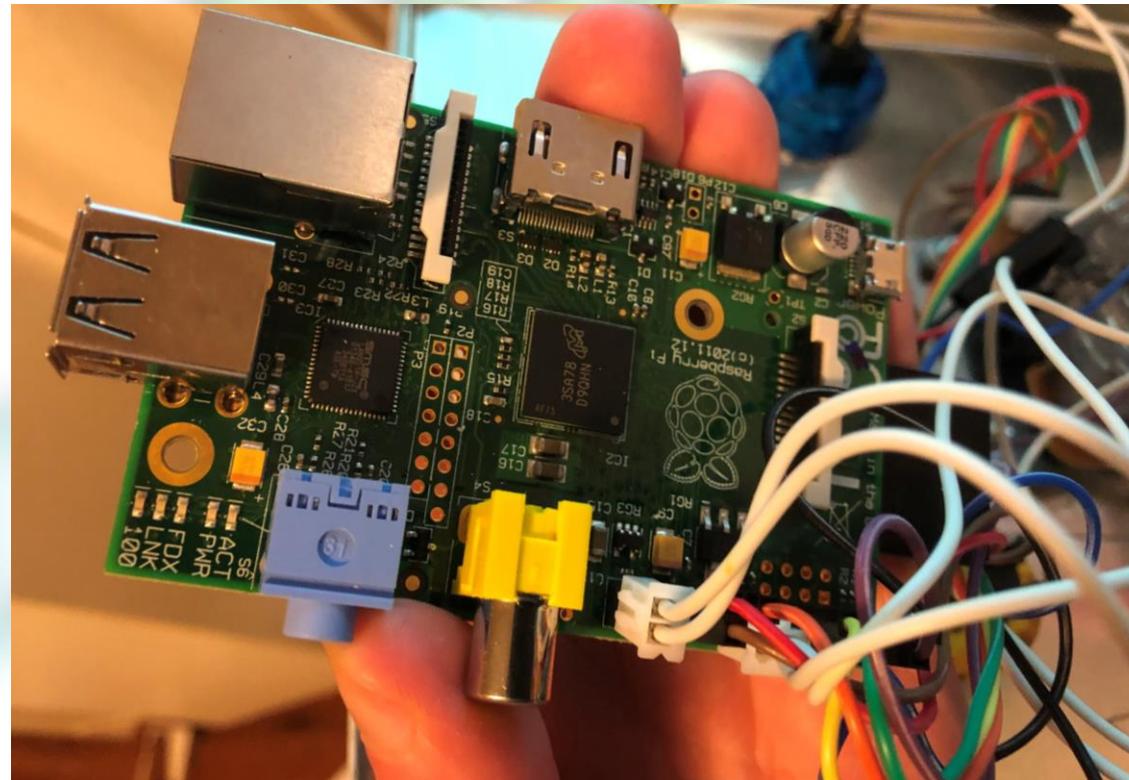
Knox Game Design

November 2020

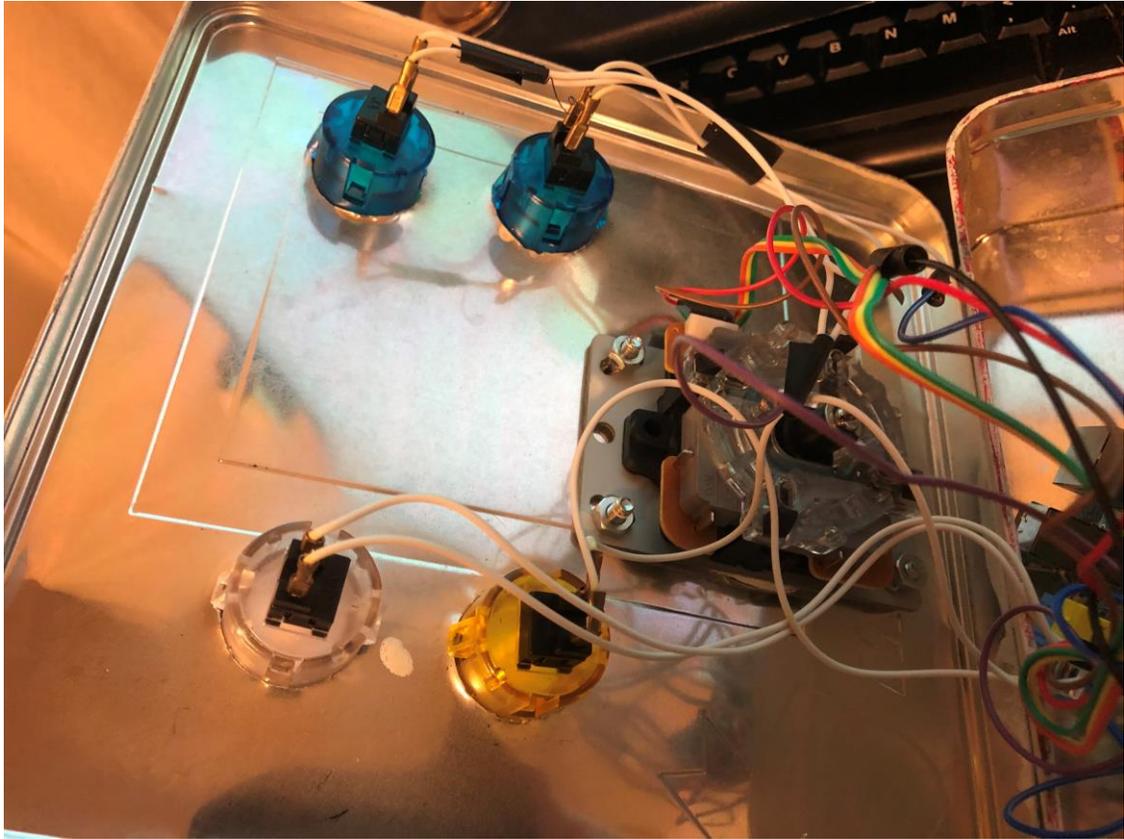
Levi D. Smith

First Build

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



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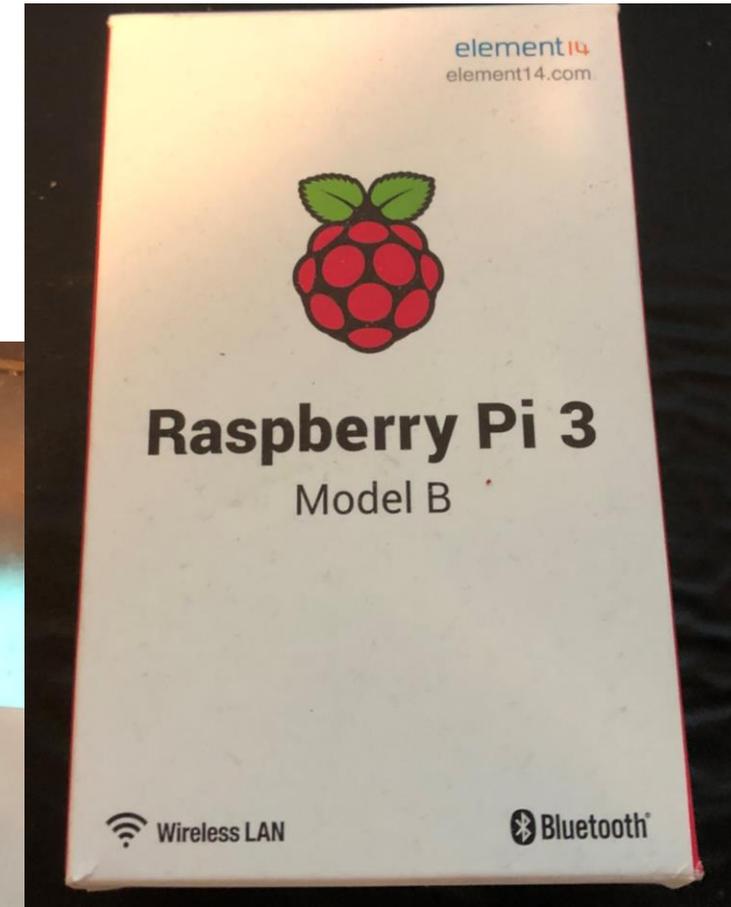
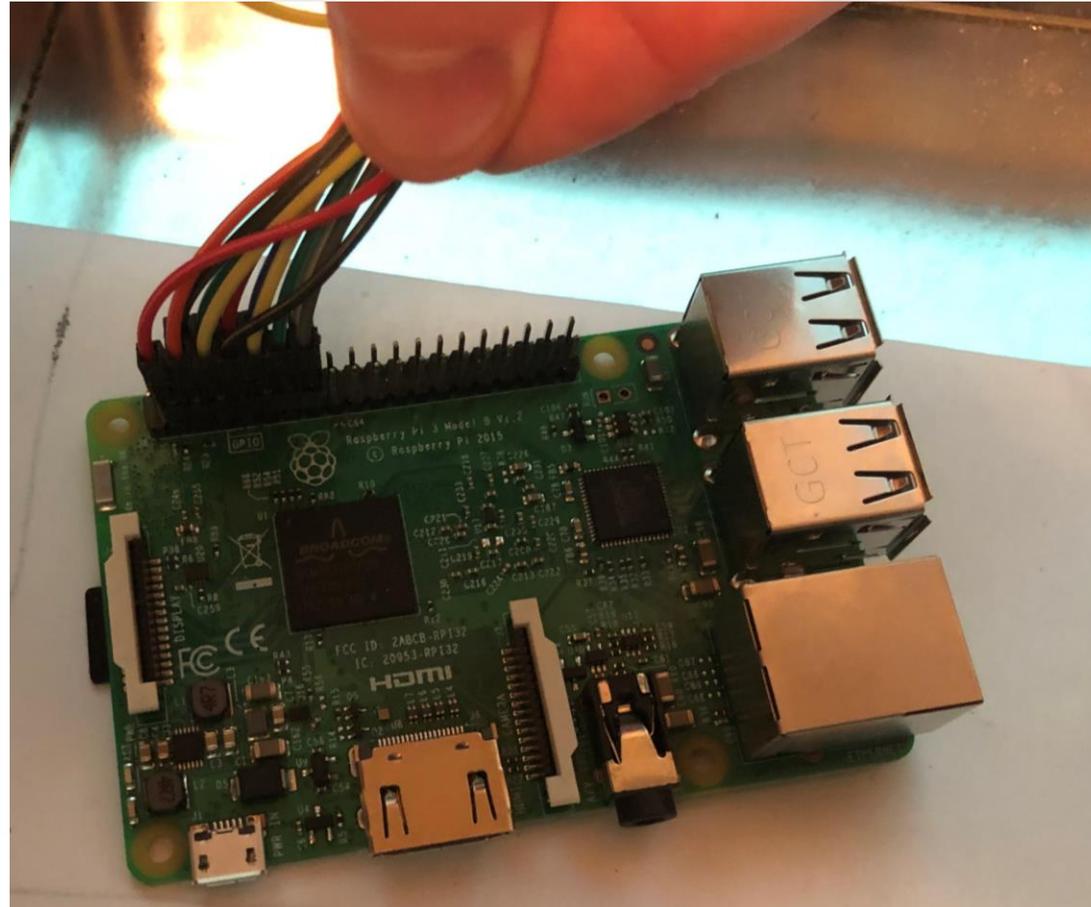
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Basics

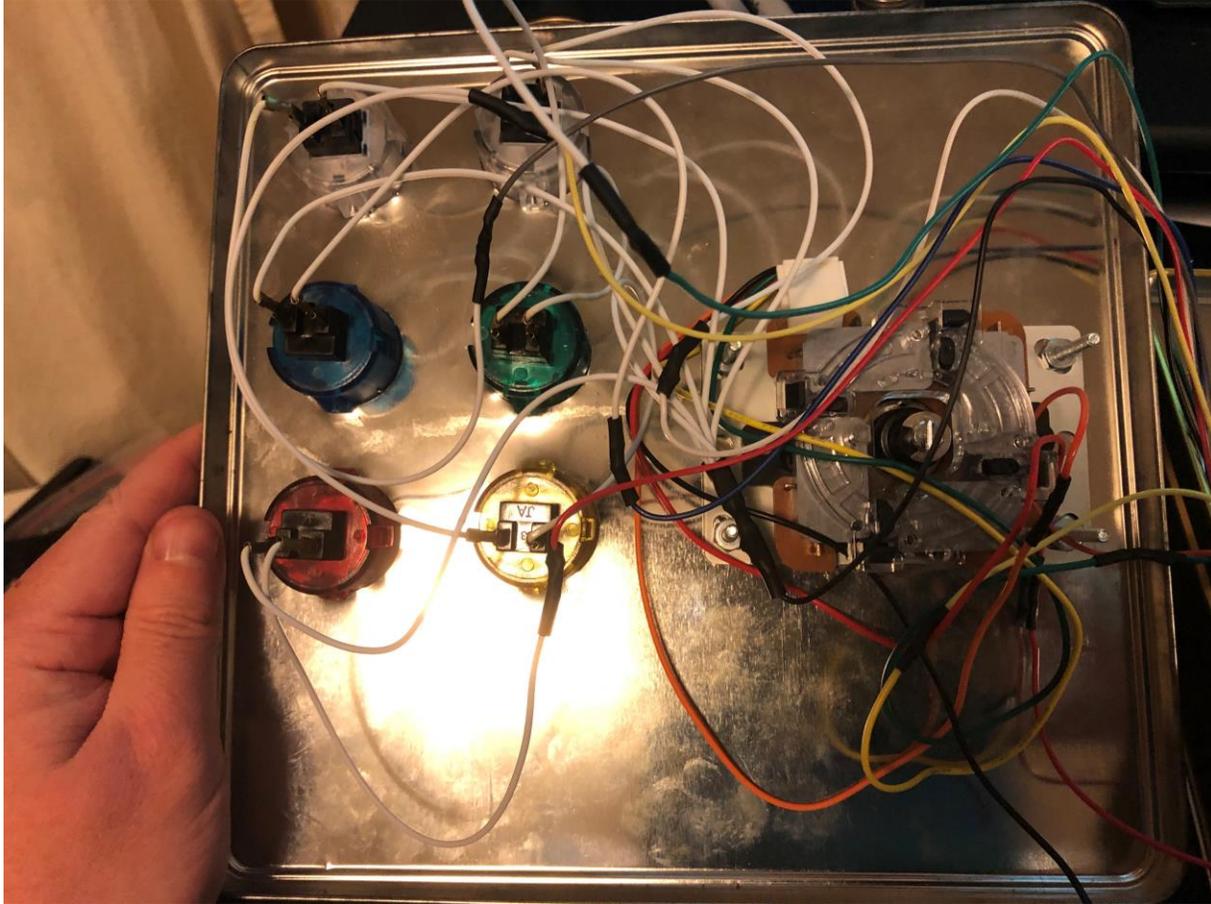
- Five wires connect to the joystick (up, down, left, right, ground)
- Two wires connect to each button (button, ground)
- Ground wires can be combined together
- Install operating system onto Raspberry Pi
- Install / configure software to convert joystick/button inputs into key presses

Second Build

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



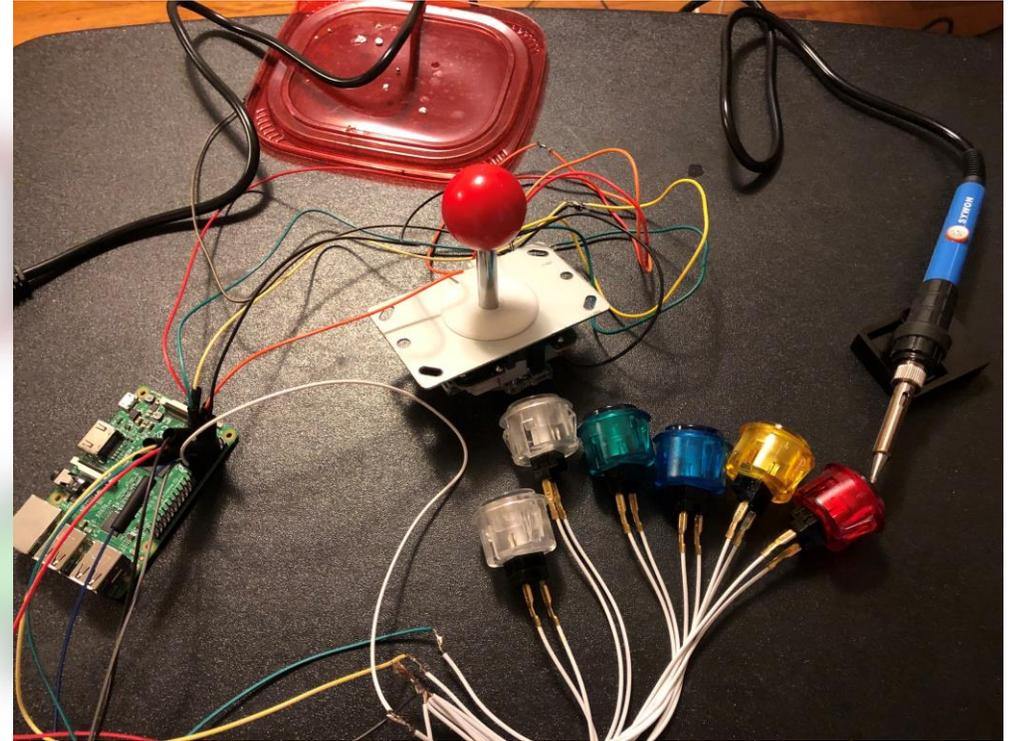
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Components

- 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



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Tools

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



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Equipment

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



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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

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

```
# Sample configuration file for retrogame.
# Really minimal syntax, typically two elements per line w/space d
# 1) a key name (from keyTable.h; shortened from /usr/include/linux
# 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
#RIGHT     22 # Joypad right
#UP        23 # Joypad up
#DOWN      27 # Joypad 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

#L          10 # Joypad left
#R          22 # Joypad right
#U          23 # Joypad up
#D          27 # Joypad down
#A         32 # 'A' button
#B         25 # 'B' button
#Z          11 # 'X' button
#C          5  # 'Y' button
#A          5
#B         14
#L         14

LEFT        2
RIGHT       3
UP          4
DOWN       14

#A         15
#B         17
#X         18
#Y         27

D          15
S          17
W          18
A          27
ENTER      22
SPACE      23
#LEFTBRACE 23
ESC        23 22

# For configuration...
```

OX
IE
IGN

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

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>