



PICO-8 Fruit Jam Reality Console

Created by John Park



<https://learn.adafruit.com/pico-8-fruit-jam-reality-console>

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Overview



PICO-8 is a delightful "fantasy console" by [Lexaloffle](https://adafru.it/1aDb) (<https://adafru.it/1aDb>) that simulates an imaginary retro system that never existed. It is intentionally constrained to 128x128 pixels with 16 colors, 4-channel chiptune audio, 8KB RAM, 32KB storage per 'cartridge', and a Lua-based programming language.

You can run **wili8jam** on Fruit Jam for a lovely, tiny computing/gaming experience. [This port, by freewili](https://adafru.it/1aDc) (<https://adafru.it/1aDc>), puts PICO-8 cartridge running, code editing, and a REPL right on your Fruit Jam, just add monitor, keyboard, and gamepad.



You normally use PICO-8 on a computer running Linux, Mac OS, or Windows for a [one-time purchase](#) of around \$15. However, there are free ports/reimplementations written from scratch that you can run on alternative systems, such as the wili8jam version used in this guide. **Note that this version is in its early days and may not run all cartridges.**

Parts



[Adafruit Fruit Jam - Mini RP2350 Computer](#)

We were catching up on a recent hackaday hackchat with eben upto and learned some fun facts:...

<https://www.adafruit.com/product/6200>



[Mini Chiclet Keyboard - USB Wired - Black](#)

Add a good quality, slim keyboard to your Raspberry Pi, Beagle Bone Black, or other single-board-computer with this sleek black chiclet keyboard. It's a full QWERTY keyboard...

<https://www.adafruit.com/product/1736>



7" Display 1280x800 (720p) IPS + Speakers - HDMI/VGA/NTSC/PAL

Yes, this is an adorable small HDMI television with incredibly high resolution and built in 3W stereo speakers! We tried to get the smallest possible HDMI/VGA display with...

<https://www.adafruit.com/product/1667>



USB Game Controller with SNES-like Layout

This is a generic USB game controller, which plugs into to provide a two-handed gaming experience for retro gaming, or really any game you want to use a handheld rather than...

<https://www.adafruit.com/product/6285>

1 x [SD/MicroSD Memory Card](https://www.adafruit.com/product/1294)
8 GB SDHC

<https://www.adafruit.com/product/1294>

1 x [Black Woven USB C to USB A Cable](https://www.adafruit.com/product/6324)
2 meters long

<https://www.adafruit.com/product/6324>

1 x [5V 1A \(1000mA\) USB port power supply](https://www.adafruit.com/product/501)
UL Listed

<https://www.adafruit.com/product/501>

1 x [9 VDC 1000mA regulated switching power
adapter](https://www.adafruit.com/product/63)
UL listed

<https://www.adafruit.com/product/63>

1 x [HDMI Cable](https://www.adafruit.com/product/608)
1 meter

<https://www.adafruit.com/product/608>

Controllers



Controllers

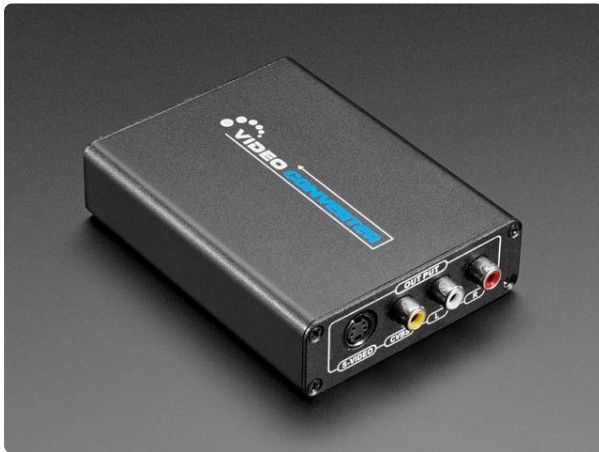
Currently the best option for USB controllers on the wili8jam PICO-8 port for Fruit Jam are wired Xbox 360/One/Series controllers (and most Xinput controllers) and PlayStation DualSense (PS5) and DualShock (PS4).

Since you're probably a pretty DIY type of gamer, I'll point out that controllers made with GP2040-CE in Xinput mode work great!

We're working on adding the generic SNES shaped USB controllers and any Wii nunchuk adapter controller over STEMMA-QT such as the Wii Classic/NES Classic/SNES Classic controllers.

Optional

If you want to immerse yourself in even more retro goodness, consider running your Fruit Jam on a CRT TV or monitor. The Fruit Jam running PICO-8 outputs a DVI video signal at 640x480 which can convert cleanly via a [HDMI to S-video or composite adapter](http://adafru.it/3537) (<http://adafru.it/3537>) to 480i 15KHz signal older TVs desire.



HDMI to RCA Audio and CVBS NTSC, PAL, or S-Video Converter

Do you have a S-Video display, projector or monitor that is not compatible with your HDMI devices? Here's an adapter that will allow you to convert HDMI to S-Video, for older...

<https://www.adafruit.com/product/3537>

Install wili8jam on Fruit Jam

The wili8jam project lives [here \(https://adafru.it/1aDc\)](https://adafru.it/1aDc) on the freewili GitHub page. Here's how it's described:

A PICO-8-compatible fantasy console for the [Adafruit Fruit Jam \(http://adafruit.it/6313\)](http://adafruit.it/6313) (RP2350B).

Runs PICO-8 `.p8` and `.p8.png` cartridges from an SD card with DVI video output, I2S audio, and USB keyboard/mouse/gamepad input. Includes an interactive Lua REPL and on-device code editor.

Features

(<https://adafru.it/1aDc>)

- **PICO-8 cartridge runner** -- loads `.p8` and `.p8.png` files with full game loop (`_init` / `_update` / `_draw`)
- **100+ PICO-8 API functions** -- graphics, audio, input, math, strings, tables, memory, coroutines, cartdata
- **8-channel audio** -- 4-channel SFX engine (8 waveforms, 7 effects) + music pattern sequencer + 4-channel basic synth
- **PICO-8 syntax preprocessor** -- `!=`, `+=`, short-form `if` / `while`, `?` `print`, `//` comments, P8SCII glyphs, `0b` literals
- **128x128 DVI display** -- 4-bit indexed framebuffer with PICO-8 16-color palette, 3x scaled to 384x384
- **Interactive Lua 5.4 REPL** -- serial terminal over USB CDC and on-screen console
- **On-device code editor** -- syntax highlighting, copy/paste, load/save `.p8` files
- **Cart picker UI** -- browse and launch cartridges from the SD card
- **USB input** -- keyboard, mouse, and gamepad via PIO-USB host (simultaneous with USB serial)
- **8 MB PSRAM heap** -- Lua allocations backed by TLSF allocator on external PSRAM

Hardware

(<https://adafru.it/1aDc>)

Board	Adafruit Fruit Jam (RP2350B)
CPU	Dual ARM Cortex-M33 @ 252 MHz
RAM	520 KB SRAM + 8 MB PSRAM
Storage	microSD (FAT32)
Display	DVI via HSTX (640x480@60Hz)
Audio	I2S to TLV320DAC3100 DAC
Input	USB-A host port (keyboard, mouse, gamepad)
Serial	USB-C (CDC terminal)

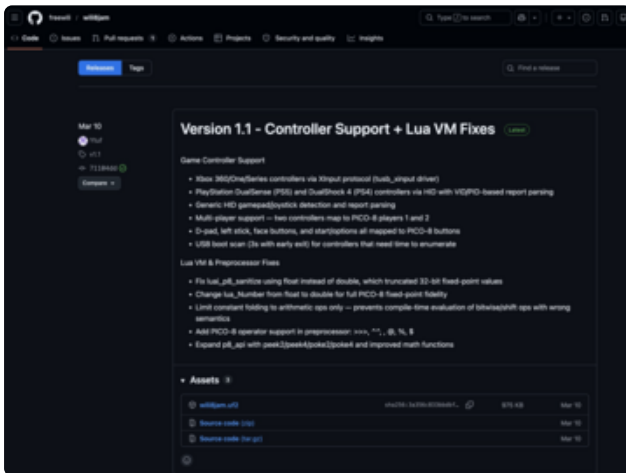
In order to install it, first head to the releases page linked below.

<https://adafru.it/1aDd>

For Generic USB Controllers

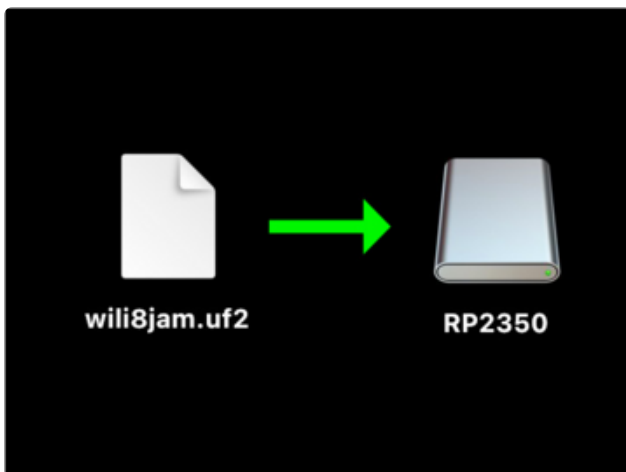
If you want to use the SNES-like USB gamepad that Adafruit and many other places sell (these are generic and often show up as "Manta controller" or "DragonRise" or generic USB gamepad with VID 081F PID E401, you can use the release linked below:

<https://adafru.it/1aDm>



UF2 Download

Click on the [wili8jam.uf2](#) link to download the latest UF2 file to your computer.



Drag and Drop

Plug in your Fruit Jam into your computer with a USB C power and data cable.

Turn on the Fruit Jam.

Next, put the Fruit Jam into bootloader mode:

press and hold **BOOTSEL/Button #1**
press and release the **Reset** button
Finally, release **BOOTSEL/Button #1**

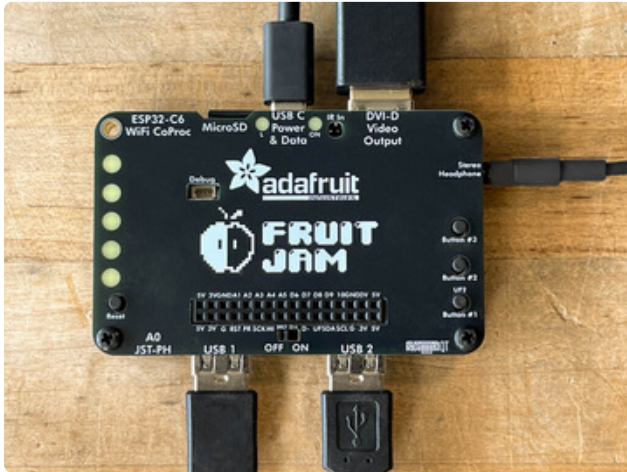
After a moment you'll see the **RP2350** drive show up on your computer. Drag and drop the **wili8jam.uf2** onto it.

After the file is copied over to the Fruit Jam it will restart and you're ready to hook it up and play! On the next page we'll get it going.

Running PICO-8 on Fruit Jam

Plug Things In

Plug in the following:



HDMI cable into Fruit Jam **DVI-D Video Output** port

Other end of **HDMI** cable to monitor or TV

3.5mm TRS audio cable into Fruit Jam

Stereo Headphone port

Other end of **audio cable** to powered speakers or headphones

Keyboard into Fruit Jam **USB 1** port

Gamepad into Fruit Jam **USB 2** port

USB C power into Fruit Jam **USB C Power & Data** port

MicroSD card into the Fruit Jam **MicroSD** card slot



Turn on the Fruit Jam's power switch. The PICO-8 startup text will appear and you'll see a prompt waiting for you to type a command. Try these:

> **INFO** This will show you info about the wili8jam PICO-8 version as well as hardware status and data

```
WILI8JAM 0.10
PSRAM: 8192 KB
SD: SDHC
AUDIO: READY
READY.
```

> **HELP** This lists all of the commands you can run

```
** WILI8JAM 0.10 **

COMMANDS:
  LOAD      LOAD < CART >
  SAVE      SAVE < CART >
  RUN        RUN CART
  LS         LS [DIR]
  CD         CD < DIR >
  RM         RM < FILE >
  CLS        CLS
  EDIT       EDIT [CART]
  REBOOT     REBOOT
  INFO       INFO
  HELP       HELP [CMD]

HELP < CMD > FOR MORE INFO
```

> **LS** This lists the contents of the current directory, or you can use a path such as **LS /CARTS** to see what's in the **cars** folder

```
BOUNCE.P8
CAST.P8
CELESTE2.P8
COLLIDE.P8
DOTS3D.P8
DRIPPY.P8
HELLO.P8
JELPI.P8
SORT.P8
WANDER.P8
WAVES.P8
WILIWAVES.P8
```

```
CAST.PB (31882)
CELESTE2.PB (88965)
COLLIDE.PB (34478)
DOTS3D.PB (30488)
DRIPPY.PB (45235)
HELLO.PB (20698)
JELPI.PB (81186)
SORT.PB (21031)
WANDER.PB (29383)
WAVES.PB (17550)
WILLOWAVES.PB (5278)

> LOAD /HELLO.PB
LOADED /HELLO.PB
> LOAD HELLO
LOADED /HELLO.PB

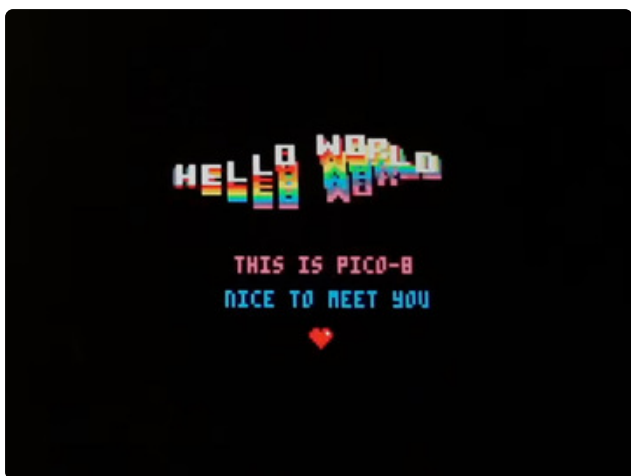
>
```

Load a Cartridge

> **LOAD** Loads a program cart into memory so you can run it. Try this:

> **LOAD /HELLO.P8** or you can play it casual and simply type

> **LOAD HELLO**



Run the Cartridge

Once the cart is loaded you can run it:

> **RUN**

```
HELLO.PB 1:1
-- HELLO WORLD
-- BY ZEP

MUSIC(0)

FUNCTION _DRAW()
  CLS()

  -- FOR EACH COLOR
  -- (FROM PINK -> WHITE)

  FOR COL = 14,7,-1 00

  -- FOR EACH LETTER
  FOR I=1,11 00

  -- T() IS THE SAME AS TIME()
  T1 = T()*30 + I*4 - COL*2

ESC:TERMINAL
```

```
HELLO.PB% 28:25
FOR COL = 14,7,-1 00

-- FOR EACH LETTER
FOR I=1,11 00

-- T() IS THE SAME AS TIME()
T1 = T()*30 + I*4 - COL*2

-- POSITION
X = 8+I*8 +COS(T1/90)*3
Y = 38+(COL-7)+COS(T1/50)*5
PAL(7,COL)
SPR(16+I, X, Y)
END
END

PRINT("THIS IS FRUITJAN",
37, 70, 14)
PRINT("NICE TO MEET YOU",
ESC:TERMINAL
```

```
DOTS30.PB (30488)
DRIPPY.PB (45235)
HELLO.PB (20698)
JELPI.PB (81186)
SORT.PB (21031)
WANDER.PB (29383)
WAVES.PB (17550)
WILTWAVES.PB (5278)

> LOAD /HELLO.PB
LOADED /HELLO.PB
> LOAD HELLO
LOADED /HELLO.PB
> RUN
> SAVE HELLO2.PB
SAVED HELLO2.PB
> LOAD HELLO2
LOADED /HELLO2.PB

>RUN
```

Escape

Press the `esc` key on your keyboard to switch from the running cart program to the editor. You can use the arrow keys to navigate and then edit the text.

Save

If you edit the code you can press `esc` again to get back to the prompt.

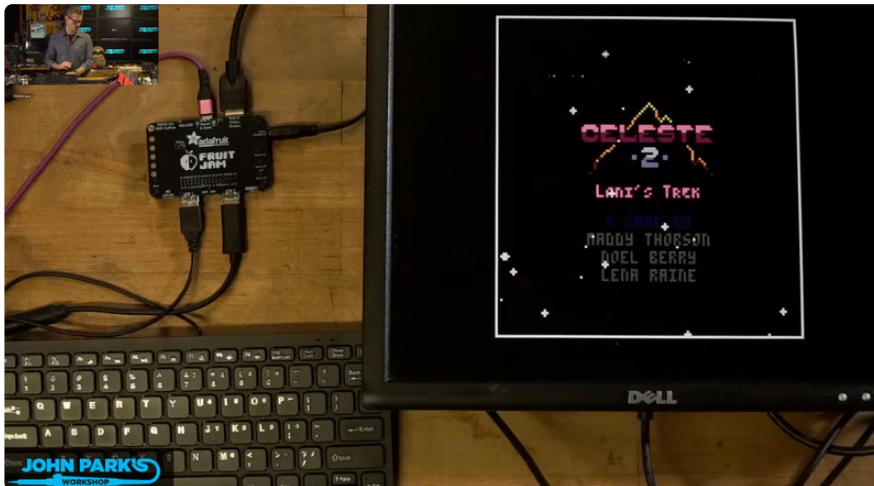
Then, `> SAVE` your code with a new file name and then `LOAD` and `RUN` it as shown here.

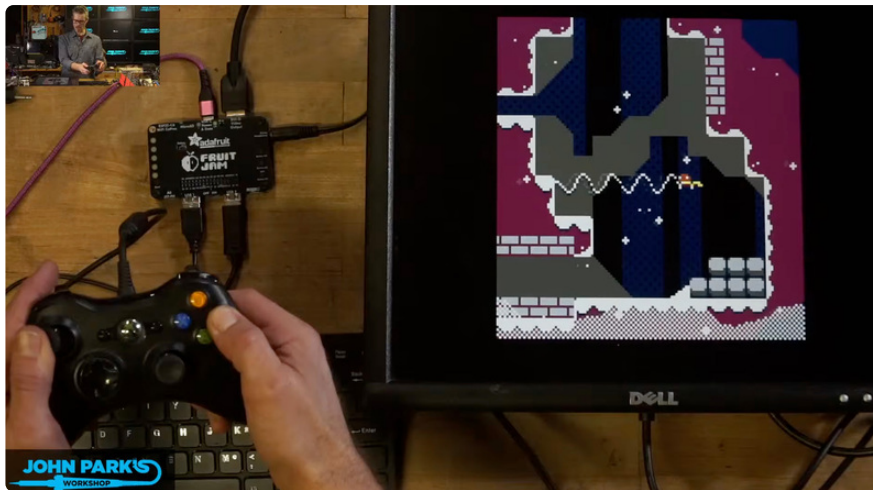


Controller

Here I've loaded up `BOUNCE.P8` to test out single button X support.

Here's some `CELESTE2` :





PICO-8 Cartridges

You can find loads of games and programs for PICO-8 online. Here are some resources:

[Lexaloffle BBS \(https://adafru.it/1aDe\)](https://adafru.it/1aDe)
[itch.io \(https://adafru.it/1aDf\)](https://adafru.it/1aDf)

Here are some curated lists:

[retrohandhelds.gg \(https://adafru.it/1aDg\)](https://adafru.it/1aDg)
[nerdyteachers.com \(https://adafru.it/1aDh\)](https://adafru.it/1aDh)



Note that this version is in its early days and may not run all cartridges.

SD Card

To play your downloaded games, simply drag them onto your SD card on your computer. Then pop the card into the Fruit Jam, boot it up, and load games from the `/CARTS` directory.



CRT Usage

If you've got an old CRT television, you can use an HDMI to analog video convert to pretty good effect. Since we're sending 640 x 480 over HDMI many converter boxes can manage the analog output at 480i.

The one I've used here is [this model](http://adafru.it/3537) (<http://adafru.it/3537>).