

# Program RP2040 in Arduino

Created by Dylan Herrada



https://learn.adafruit.com/rp2040-arduino-with-the-earlephilhower-core

Last updated on 2021-11-15 08:25:09 PM EST

### Table of Contents

Overview	3
• Parts	4
Installing the Earle Philhower core	5
Connecting your RP2040	7
Uploading a Sketch	8

### Overview



In this guide you'll learn how to install <u>Earle Philhower's Arduino core</u> (https://adafru.it /ToC) for RP2040 devices, arduino-pico. This core supports a bunch of different RP2040 boards.

Supported boards at time of writing (there's probably more now)

- Raspberry Pi Pico
- Adafruit Feather RP2040
- Adafruit ItsyBitsy RP2040
- Adafruit Macropad RP2040
- Adafruit QTPy RP2040
- Adafruit STEMMA Friend RP2040
- Adafruit Trinkey RP2040 QT
- Arduino Nano RP2040 Connect
- SparkFun ProMicro RP2040
- Generic (configurable flash, I/O pins)

This core makes it easy to use Arduino with all your favorite RP2040 boards so you can create fast projects using them.

### Parts

The core supports all the boards below so pick whichever you want. There are some boards supported that haven't even been released yet, so if there's one on that list you want to use, check back later.



#### Raspberry Pi Pico RP2040

The Raspberry Pi foundation changed single-board computing when they released the Raspberry Pi computer, now they're ready to...

https://www.adafruit.com/product/4864



#### Adafruit Feather RP2040

A new chip means a new Feather, and the Raspberry Pi RP2040 is no exception. When we saw this chip we thought "this chip is going to be awesome when we give it the Feather...

https://www.adafruit.com/product/4884



#### Adafruit ItsyBitsy RP2040

A new chip means a new ItsyBitsy, and the Raspberry Pi RP2040 is no exception. When we saw this chip we thought "this chip is going to be awesome when we give it the ItsyBitsy...

https://www.adafruit.com/product/4888



### Adafruit Trinkey QT2040 - RP2040 USB Key with Stemma QT

It's half USB Key, half Adafruit QT Py, and a lotta RP2040...it's Trinkey QT2040, the circuit board with an RP2040 heart and Stemma QT legs....

https://www.adafruit.com/product/5056

## Installing the Earle Philhower core

The first step to getting the Earle Philhower core to run on your RP2040 device is to install it.

First, open the Arduino IDE.

Then, navigate to File -> Preferences and paste the link below into Additional Board Manager URLs. If the field is initially blank, just paste the link in and press OK. If there are already one or more URLs there, add a comma to the last one and paste the link there and press OK.

<u>File</u> <u>E</u> dit <u>S</u> ke	tch <u>T</u> ools <u>H</u> elp	
New	Ctrl+N	
Open	Ctrl+0	
Open Recent	>	
Sketchbook	>	
Examples	>	
Close	Ctrl+W	e second, then off for one sec
Save	Ctrl+S	on-board LED you can control.
Save As	Ctrl+Shift+S	tal pin 13, on MKR1000 on pin
Page Setup	Ctrl+Shift+P	at pin the on-board LED is cor
Print	Ctrl+P	ical Specs of your board at: /en/Main/Products
Preferences	Ctrl+Comma	
Quit	Ctrl+Q	
modified 7	2 Son 2016	

The link to copy and paste:

https://github.com/earlephilhower/arduino-pico/releases/download/ global/package\_rp2040\_index.json

	Preferences
Settings Network	
Sketchbook location:	
/home/dherrada/snap/arduino	/current/Arduino Browse
Editor language:	System Default v (requires restart of Arduino
Editor font size:	12
Interface scale:	Automatic 198 ** (requires restart of Arduino)
Theme:	Default theme
Chev werkens subsub durings	Crequires restart of Arduino)
Show verbose output during:	compliation upload
Compiler warnings:	None
Display line numbers	Enable Code Folding
🗹 Verify code after upload	Use external editor
Check for updates on star	tup 🗹 Save when verifying or uploading
✓ Use accessibility feature	5
Additional Boards Manager UR	Ls: /ino-pico/releases/download/global/package_rp2040_index.json
More preferences can be edit	ed directly in the file
/home/dherrada/snap/arduino/	56/.arduino15/preferences.txt
(edit only when Arduino is n	ot running)
	OK Cancel
	)) wate for a possing

Click "OK" to save these preferences. Then, go to Tools -> Board -> Board Manager and type pico into the search bar, and hit enter. Select Raspberry Pi Pico/RP2040 by E arle F. Philhower, III and press Install. Then press close and you should be all set to connect your RP2040.

/* Blink		
Turne on LED on for	and cocord then of	ff for any cocord, reportedly
TUTTIS ALLED OF TOT	one second. then of	Boards Manager
Type All	<pre>v pico</pre>	
[DEPRECATED – Please by Arduino Boards included in this pa Arduino Nano 33 BLE, Ardu	<b>install standalone pac!</b> ckage: µino Nano 33 BLE Sense, Ard	kages] Arduino Hbed OS Boards uino Nano RP2040 Connect, Arduino Portenta H7, Arduino Edge Control, Raspberry Pi Pico.
Arduino Mbed OS RP204 by Arduino Boards included in this par Raspberry Pi Pico.	0 Boards	
Raspberry Pi Pico/RP2 by Earle F. Philhower, II Boards included in this pa Raspberry Pi Pico, Adafruit RP2040, Adafruit Trinkey R More Info	<b>840</b> I ckage: Feather RP2040, Adafruit Its P2040 QT, Arduino Nano RP2	syBitsy RP2040, Adafruit Macropad RP2040, Adafruit QTPy RP2040, Adafruit STEMMA Friend 2040 Connect, SparkFun ProMicro RP2040, Generic RP2040 Module. 1.8.6 V Install
delay(1000);	// w	close wait for a second

## Connecting your RP2040

Now that you've successfully installed the core, you can move on to connecting your RP2040 to the Arduino IDE.



To connect your RP2040 microcontrollerbased board, connect it to your computer via a known good USB power+data cable. Hold down the BOOTSEL button when you're plugging it in to enter the bootloader. It should then show up as a USB drive with the name RPI-RP2 (or something similar) in your computer File Explorer / Finder (depends on operating system).

You only need manually to enter the bootloader the first time you load an Arduino sketch onto your Pico. It is not necessary to manually enter the bootloader to load subsequent sketches once you are already running an Arduino sketch.

Then in the Arduino IDE, go to Tools -> Board -> Raspberry Pi RP2040 Boards and select the board you are using.

dit <u>S</u> ketch	Tools Help					
	Auto Format	Ctrl+T			ø	
	Archive Sketch				_	
¢	Fix Encoding & Reload					
*	Manage Libraries	Ctrl+Shift+I			î	
in.	Serial Monitor	Ctrl+Shift+M				
ns an LED	Serial Plotter	Ctrl+Shift+L	peatedly.			
: Arduinos	WiFi101 / WiFiNINA Firmware Updater		UNO, MEGA and ZERO			
correct L	Board: "Raspberry Pi Pico"	>	Boards Manager			
/ou want t	Flash Size: "2MB (no FS)"	>	Arduino AVR Boards	>		
S://www.a	CPU Speed: "125 MHz"	>	ESP32 Arduino	>		
ified 8 Ma	Debug Port: "Disabled"	>	Raspberry Pi RP2040 Boards(1.8.6)	>	• Ramberry Pi P	ico
Scott Fitz	Debug Level: "None"	>			Raspberry Pi P	ico (Picoprobe)
ified 2 Se	USB Stack: "Pico SDK"	>			Adafruit Feath	er RP2040
lfied 8 Se	Port	>			Adafruit Feath	er RP2040 (Picoprobe)
Colby Newm	Get Board Info				Adafruit ItsyB	itey PD2040
s example	Programmer	>			Adafruit Itays	itey RP2040 (Diconroba)
)://www.ar.	Burn Bootloader				Adafruit OT Bu	DD2040
					Adafrate of Py	RP2040 (Disesse)
) setup fur	nction runs once when you press	reset or power	r the board		Adafrate of Py	RF2040 (PCCoprobe)
<pre>setup() {</pre>	digital pip LED PUTLITIN as ap a	itout			Adarrutt STERN	A Friend RP2040
fode(LED_B	UILTIN, OUTPUT);	atput.			Adarrutt SIEMA	A Friend RP2040 (Picoprobe)
					Adafruit Trink	ey RP2040 QT
}loop fun	ction runs over and over again f	prever			Adafruit Trink	ey RP2040 QT (Picoprobe)
.oop() {	ED BUILTIN HIGH) // turp th	LED on (HIG	is the voltage level)		Adafruit Macro	Pad RP2040
ay(1000);	// wait fo	r a second	i is the voltage tevel)		Adafruit Macro	Pad RP2040 (Picoprobe)
italWrite(	LED_BUILTIN, LOW); // turn th	e LED off by m	making the voltage LOW		🔵 Arduino Nano R	P2040 Connect
<i>y</i> (1000),	// HOLE TO	a secona			🔵 Arduino Nano R	P2040 Connect (Picoprobe)
					🔵 SparkFun ProMi	cro RP2040
					🔵 SparkFun ProMi	cro RP2040 (Picoprobe)
					🔵 Generic RP2040	
					◯ Generic RP2040	(Picoprobe)

Now, you're going to want to select the correct port to use. Open Tools -> Port, and select the right port. On my computer, it was /dev/ttyS0. If it only gives you the options to use a port with ACM (Linux) in it, as in /dev/ttyACM0 or usbmodem (Mac/OSX), as in /dev/tty.usbmodem14301 then try unplugging it and plugging it back in, making sure to hold down the BOOTSEL button as you do so. On Windows, serial ports show up as COM ports.

Tools Help		
Auto Format	Ctrl+T	
Archive Sketch		
Fix Encoding & Reload		
Manage Libraries	Ctrl+Shift+I	
Serial Monitor	Ctrl+Shift+M	
Serial Plotter	Ctrl+Shift+L	peatedly.
WiFi101 / WiFiNINA Firmware Updater		UNO, MEGA and ZERO
Board: "Raspberry Pi Pico"	>	BUILTIN IS SET TO
Flash Size: "2MB (no FS)"	>	to on your Arduino
CPU Speed: "125 MHz"	>	
Debug Port: "Disabled"	>	
Debug Level: "None"	>	
USB Stack: "Pico SDK"	>	
Port	>	Serial ports
Get Board Info		dev/tty50
Programmer	>	
Burn Bootloader		

Note that after you flash your first sketch, the board will not show up as a USB drive and will use ports such as /dev/ttyACM0, COM, or /dev/tty.usbmodem14301. Make sure to change the port in Tools -> Port.

# Uploading a Sketch

Finally, to test that everything works, you can upload an example sketch that will make the onboard LED fade in and out.

Now that you've installed everything and connected your RP2040, it's time to flash a sketch to your board. Navigate to File -> Examples -> Examples for Raspberry Pi Pico and select the Fade example. Then press the upload button and your code should start running in a few seconds.

File Edit Sketch Tools Hel	p	
New Ctrl+N		
Open Ctrl+O		
Open Recent >		
Sketchbook >		
Examples	<b>A</b>	
Close Ctrl+W	Examples for Raspberry Pi Pico	
Save Ctrl+S	Adafruit TinyUSB Library	> 1d ZERO
Save As Ctrl+Shift+S	EEPROM	> set to
Page Setup Ctrl+Shift+P	ESP8266SdFat	> Arduino
Print Ctrl+P	I2S	>
Preferences Ctrl+Comma	Keyboard	>
Quit Ctrl+0	LittleFS	>
modified 2 Sep 2016	Mouse	>
by Arturo Guadalupi	PDM	>
by Colby Newman	rp2040	> Bootsel
This example code is i	SD	> Fade
THITS EXAMPLE CODE IS 3	Servo(rp2040)	> Multicore
http://www.arduino.cc/	Wire	> Siren
/	Examples from Custom Libraries	Temperature
<pre>// the setup function ru woid setup() {</pre>	Adafruit AHTX0	> Time
// initialize digital	Adafruit BusIO	> ToneHappyBirthday
<pre>pinMode(LED_BUILTIN, 0 }</pre>	Adafruit DotStar	>



If it worked, your RP2040 should look something like this.