

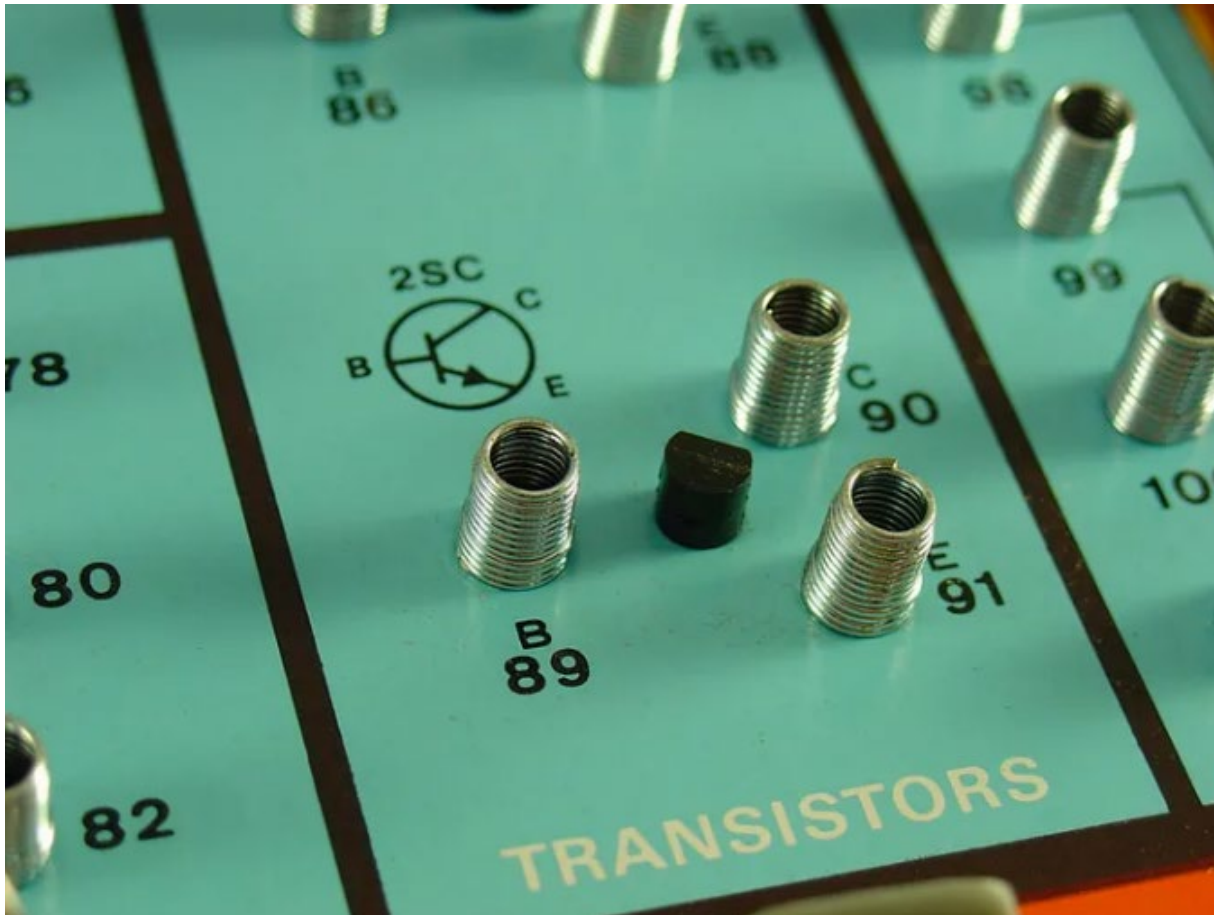
# Make Something (Fun)!

By Dave Andrus K7DAA

# The 1970's Are Calling!

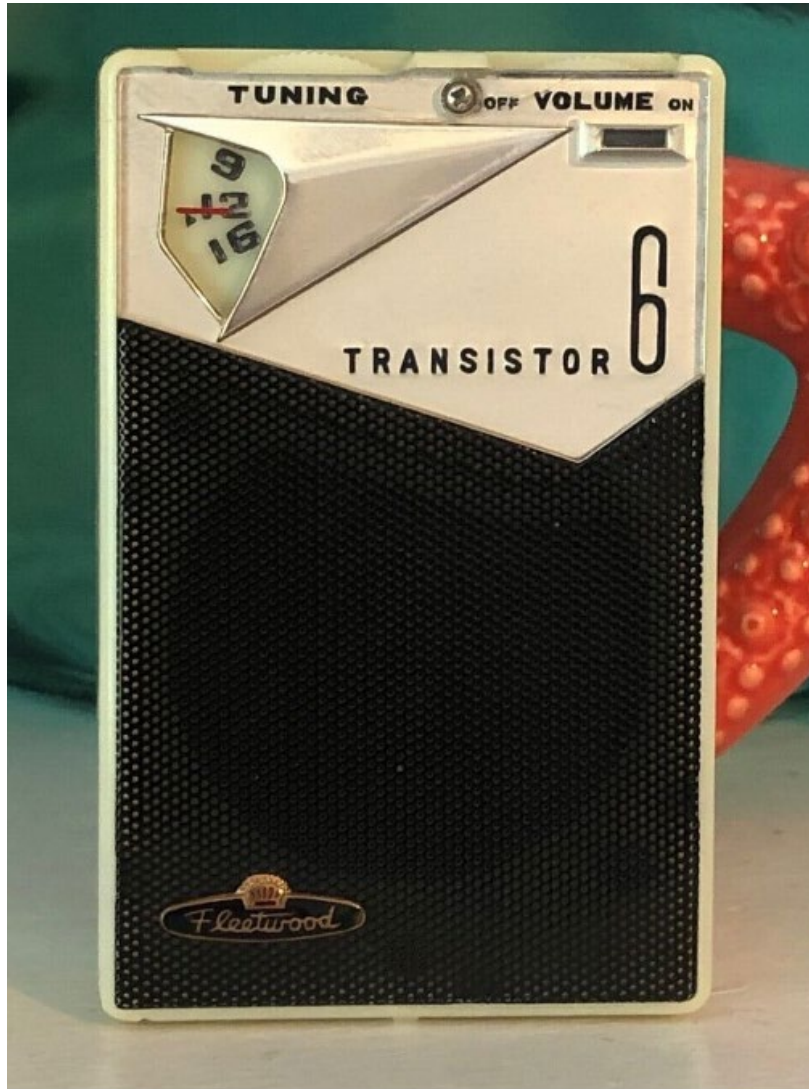


# Springs & Wires





# The Late 1950's Are Calling...



# I Started to Experiment Then, Shared With Others

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1186 Drifting Circle Drive  
Vista CA 92083

## Remote-Controlled Everything

*Secure, wireless control for your next project is no longer a remote possibility.*

**R**emote-controlled garage-door openers are becoming so common now that many people, including me, consider them as much a necessity as a toaster or lawn mower. Almost all door openers use a radio link to start the motor that raises and lowers the door.

Have you ever looked at that little transmitter clipped to the visor of your car and wondered what was inside? Maybe you opened it up (after all, you're a ham, right?) and were surprised to see only a small handful of parts. I'll bet you thought, "Gee, and they want thirty bucks for a new transmitter!"

switch that powers up the rest of the transmitter when closed. The digital-coding IC sends a serial stream of pulses to the base of a single-transistor oscillator. The oscillator turns on with a high pulse, and is off between pulses. The antenna is usually just the oscillator's inductor stretched out so that it will radiate better.

This on/off signal (just think of it as fast CW) is picked up at the receiver by a superregenerative detector. Back in earlier times, many simple receivers built by hams used superregenerative detectors. They have their limitations, which we'll talk about in a mo-

that are purposely incompatible with each other. All are based on the same principle, though.

Look at Fig. 2. This is a pinout for the National MM53200 chip. It is available from several sources, such as Jameco. Pins 1 through 12 are for setting the code you want. Twelve inputs means that you can have  $2^{12}$ , or 4096, different codes. The connections to these pins must match in both the transmitter and the receiver. Fig. 3 shows how the connections should be made. Either a DIP switch or jumpers can be used. The IC has internal pull-ups on the code input pins, so they are

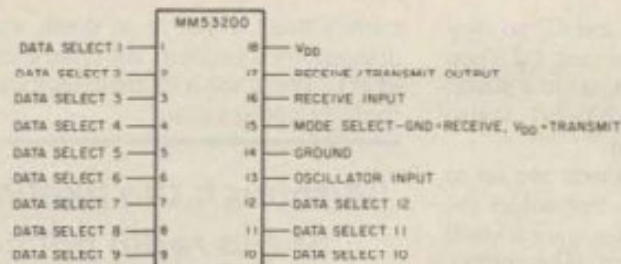


Fig. 2. Pinout of the National Semiconductor MM53200 encoder/decoder chip.

mitter or a receiver. Grounding it gives you a receiver. Connect it to the battery supply (pin 18) for a transmitter. Do not leave it open. If it is a receiver, send the data in on pin 16. If it's set up as a transmitter, the data comes out on pin 17, and pin 16 is grounded also. I recommend that you test the setup in Fig. 3 with a solderless breadboard, first. Just connect the code output, pin 17, from the transmitter to the code input, pin 16, on the receiver. Then watch the normally-high output from pin 17 on the receiver go low when the codes match. You can do that with a low-current LED or a voltmeter. Later on, this output will drive a transistor that will energize a relay.

Fig. 4 shows the nature of the data being sent and received in this system. Starting from the left, there is an 11.52-millisecond pause, then a start bit, then the twelve data bits, then another pause, then a start bit, etc. This data stream is continuous as long as the transmitter is powered up.

The start bit and twelve data bits make up one word. A word is the same length as the pause between words. The receiver chip has to see 4 words in a row that are valid (the transmitter code matches the code on the receiver switch inputs), and then pin 17 will go low. Do not try to drive an LED directly with this pin unless you use a low-current type. The pin will sink only a maximum of 2 milliamps.

links, and they are great if you need several channels with a single transmitter and receiver pair. An example would be for controlling the various movements and functions on a robot.

### The Transmitter

Let's build a transmitter first. Fig. 5 shows how simple it can be. Don't be concerned if you don't have some of the exact part values specified. R1 and R2 can vary by 2:1 (don't go below 47k on R1), and I have listed most of the transistors that can work in this circuit, including one (MRF-901) that can be bought at Radio Shack. It is a real overkill for this circuit, though. If you have trouble getting parts for any of these circuits, they are available from me for a nominal cost as long as you don't want hundreds of them.

Returning to Fig. 5, we find a simple Pierce oscillator that has feedback from base to collector. Many hams don't have a solid understanding of what makes an oscillator oscillate. An oscillator is simply an amplifier tuned to the desired frequency that has some feedback from output to input.

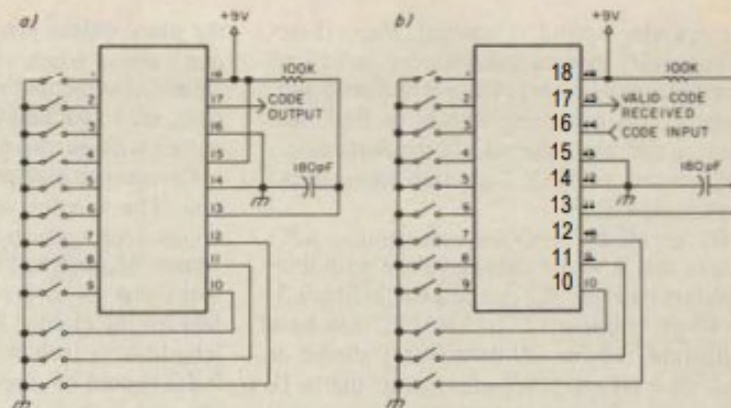


Fig. 3. Wiring the chip for: a) transmitter operation and b) receiver operation.

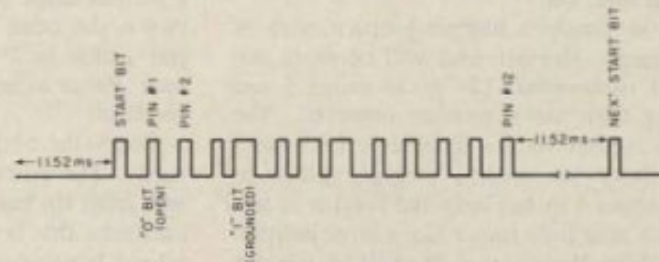


Fig. 4. Data format as sent by the transmitter chip when pins 4, 6, and 7 are grounded.

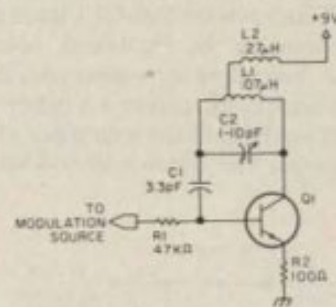
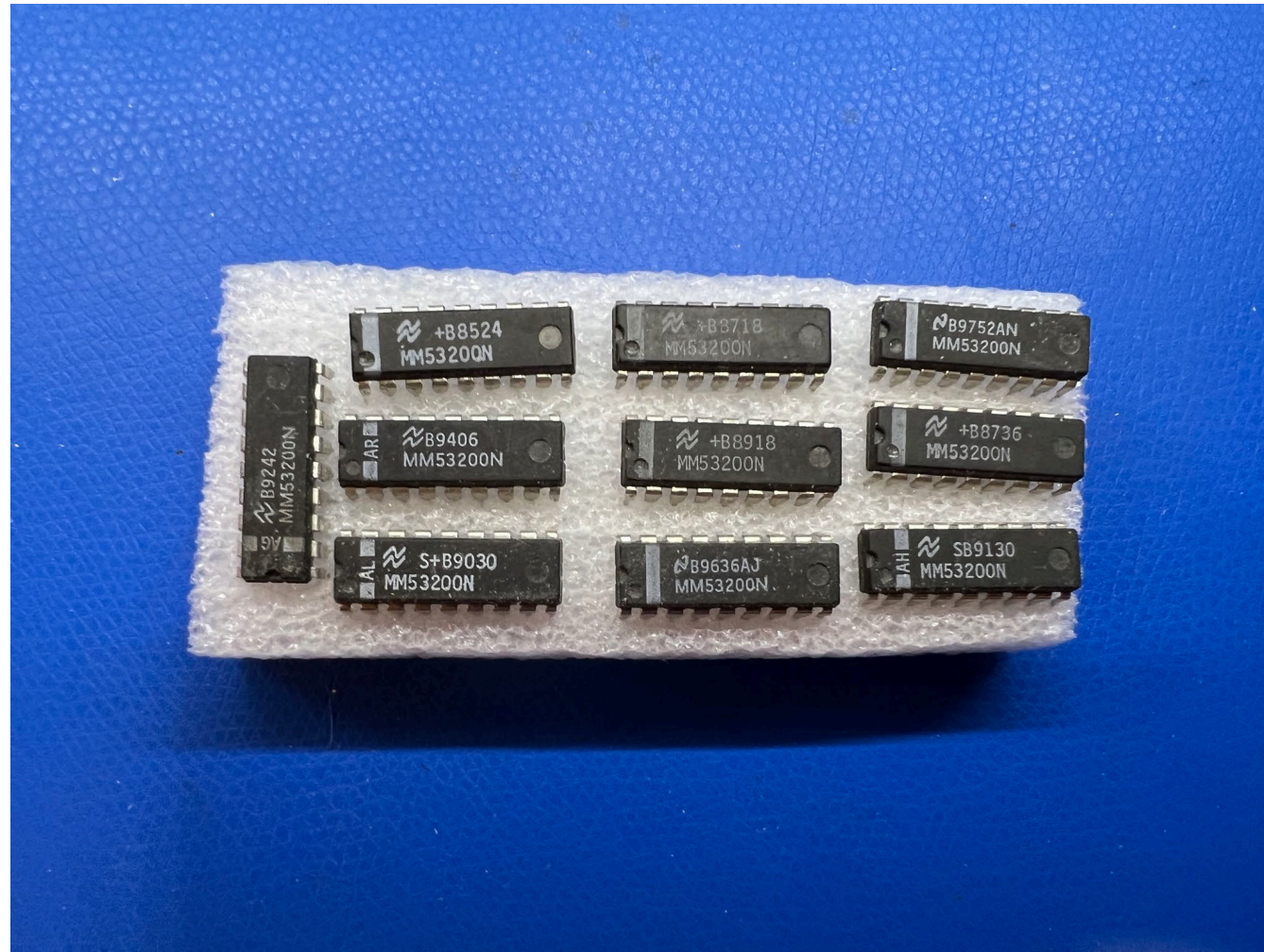


Fig. 5. The transmitter rf oscillator. Q1 can be a 2N918, 2N5179, 2N5770, 2N3563, MP-SH10, MPSH11, or MRF901 (Radio Shack 276-2044).

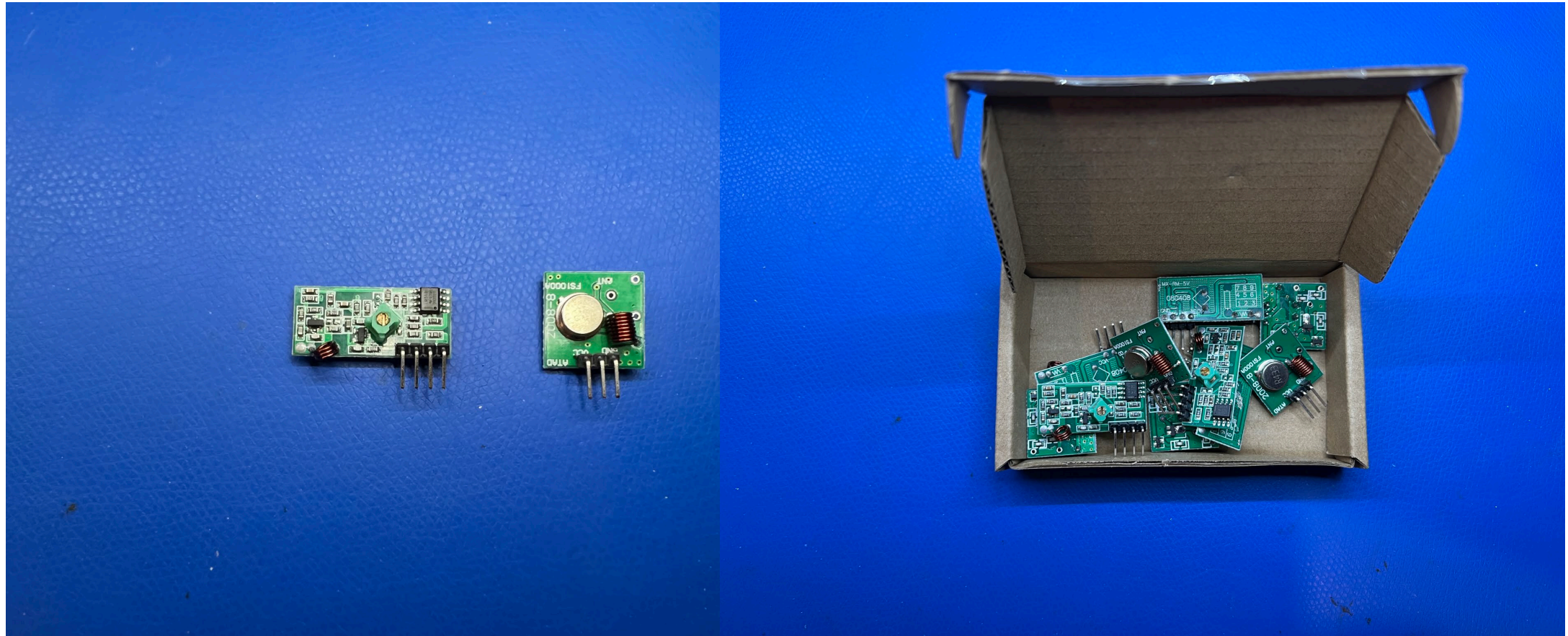
# Simple Transmit/Receive Chips from eBay \$2-3 ea

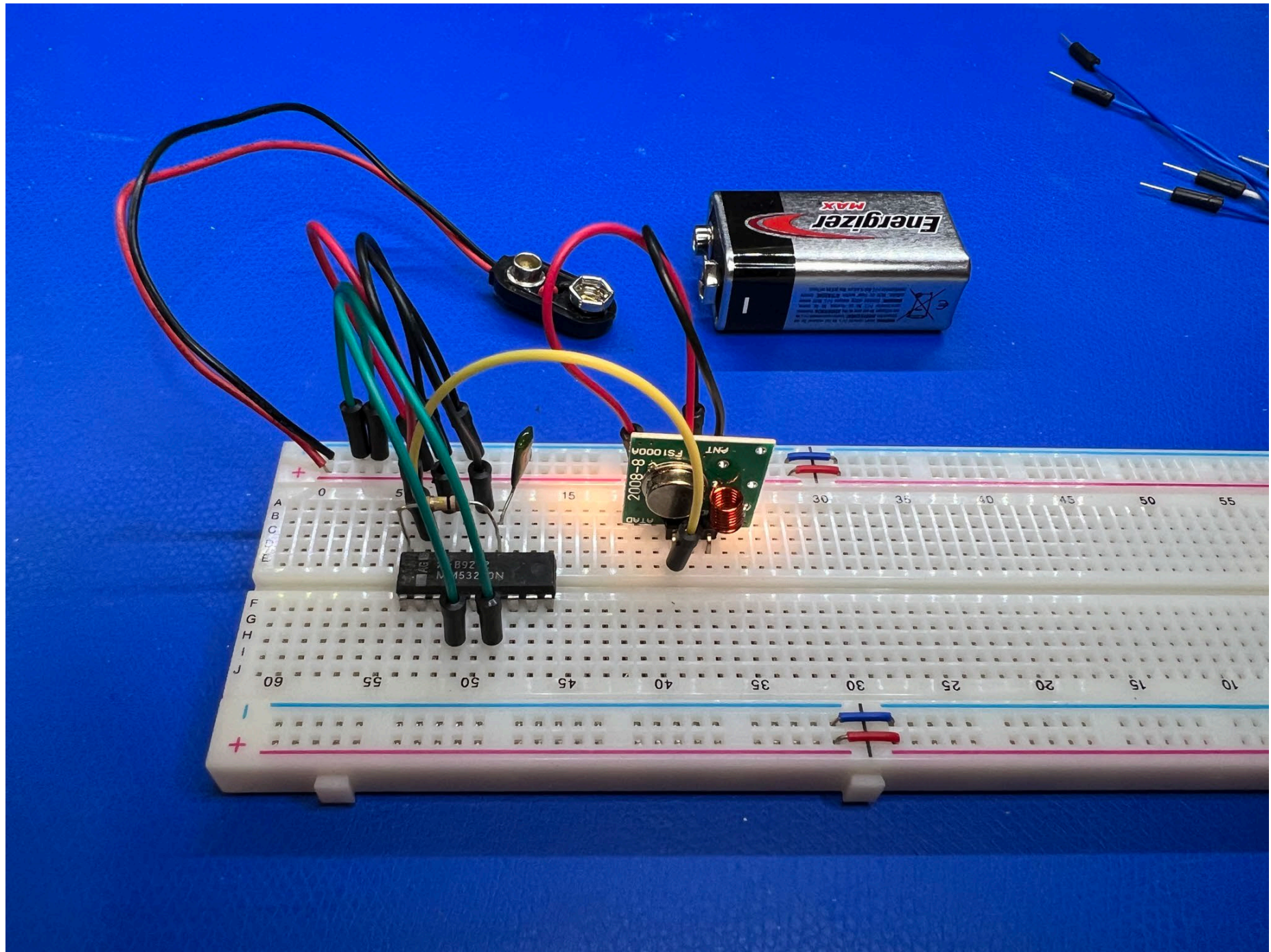
National Semiconductor (RIP) MM53200N 18 pin chips only need 1 resistor & 1 capacitor  
Used in many applications: Door controls, fire your model rocket, then a beacon for recovering it, etc. Add a switch, relay, LED or whatever



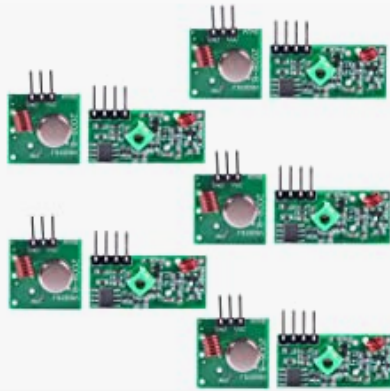


# Make Your Own Wireless Stuff Without Soldering





Purchased Jun 2023

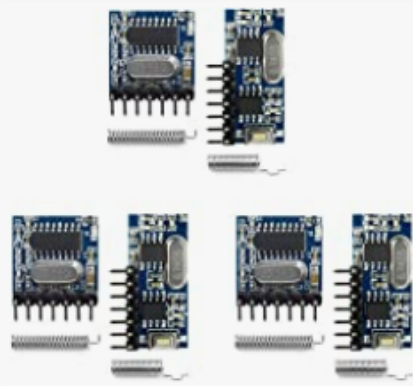


### HiLetgo 5 Sets 433M Transmitter + Receiver Kit High Frequency Super Regenerative Transceiver Module for Burglar Alarm

★★★★☆ ~ 213

\$8<sup>79</sup>

✓prime Two-Day  
FREE delivery **Sat, Jun 17**

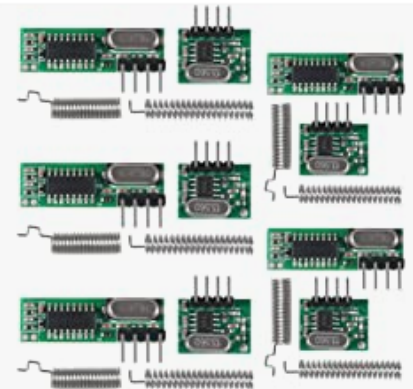


### QIACHIP 3 Sets of 433mhz RF Transmitter and Receiver Module Wireless 4 Channel Output Link Kit Set with 1527 Learning Code for Remote Control

★★★★☆ ~ 19

\$15<sup>99</sup>

✓prime One-Day  
FREE delivery **Tomorrow, Jun 16**  
Or FREE delivery **Overnight 7 AM - 11 AM** on \$25 of qualifying items



### D-FLIFE 5pcs 433mhz Wireless RF Transmitter and Receiver with Antenna Ask Remote Control Module DIY Kit for Arduino

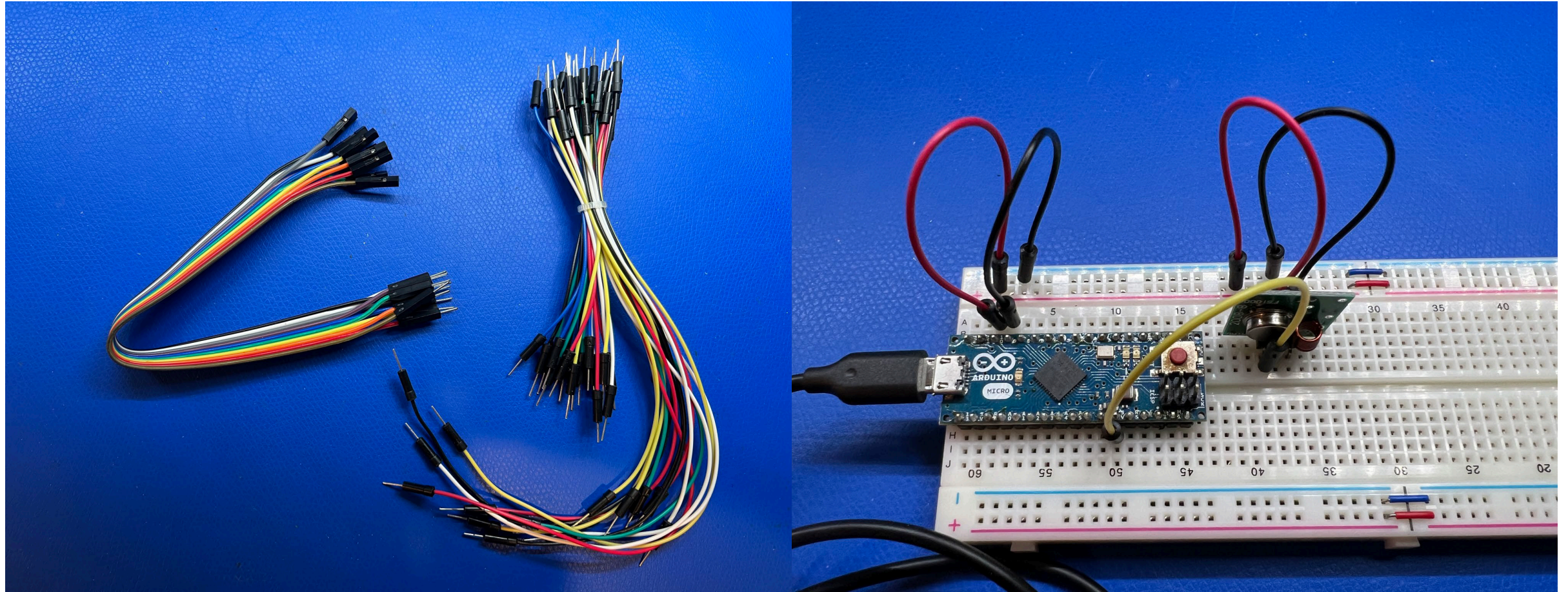
\$8<sup>99</sup>

Prime  
FREE delivery **Wed, Jun 21**  
Only 8 left in stock - order soon.

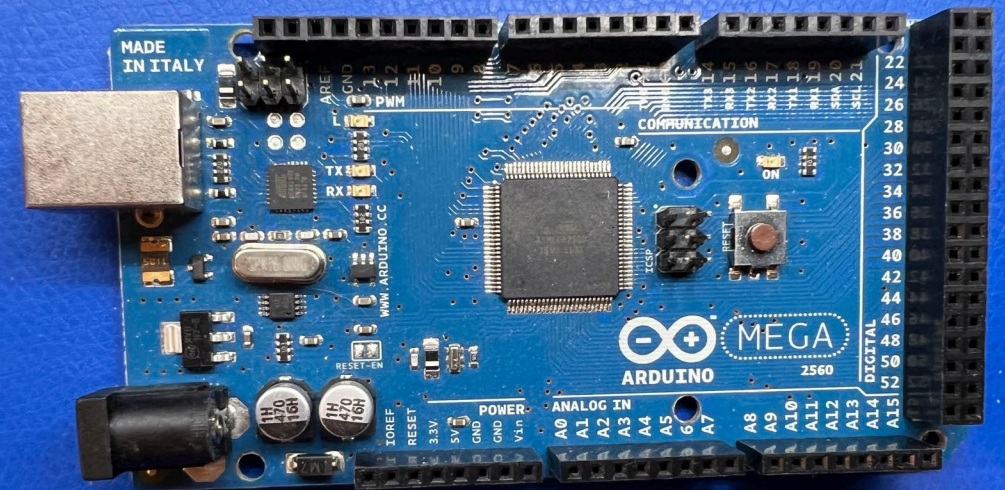
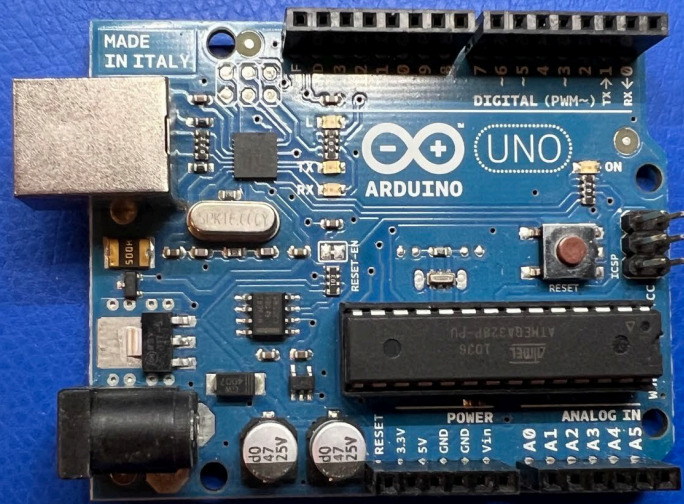
# I Recommend a Few Simple Tools



# Do I Use a \$2 Chip, or a \$5 Computer Module?



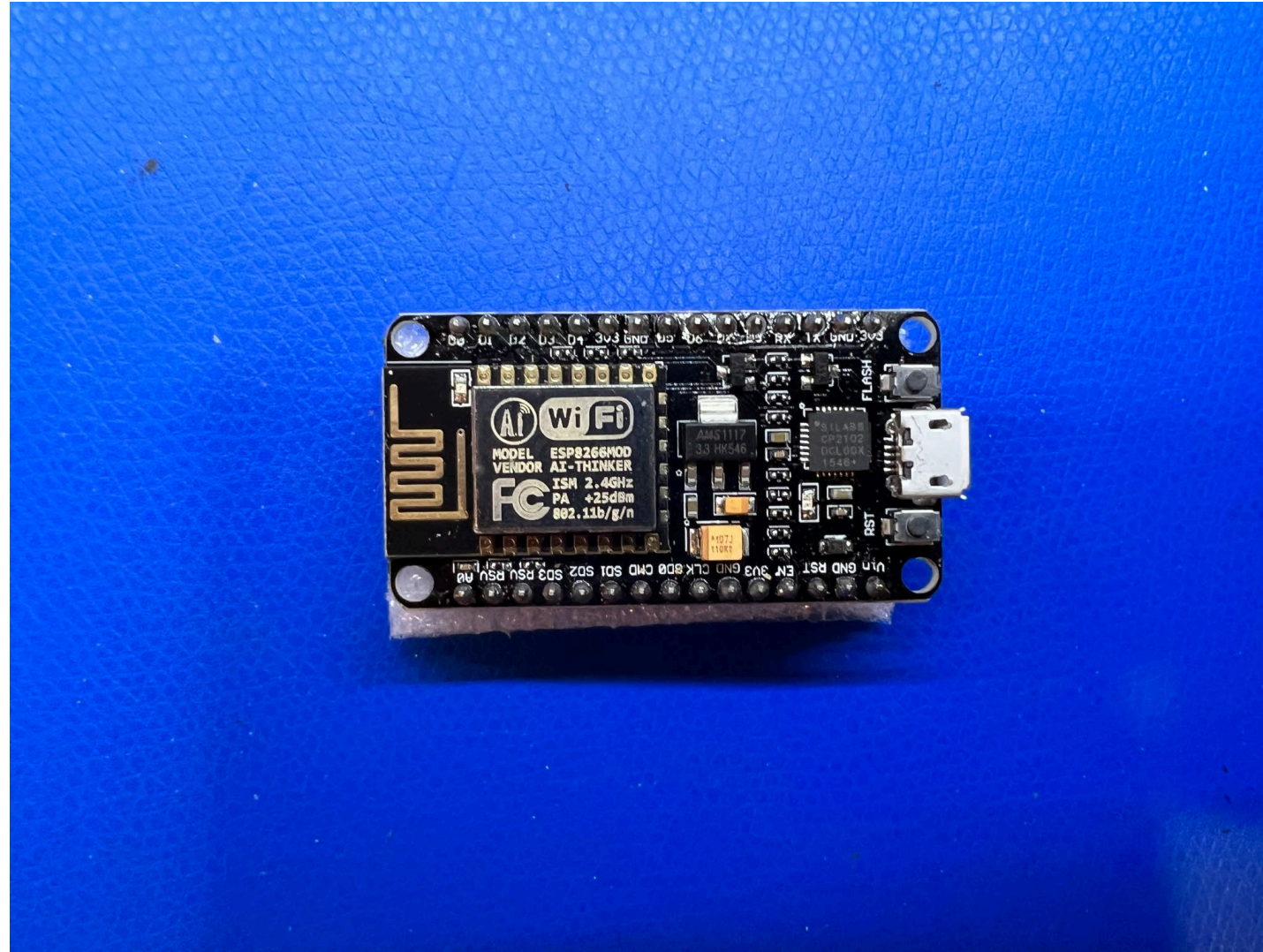
# Arduinos: Any Size You Can Imagine



# Arduinos: Mini, Micro or ESPxx with Wi-Fi/BT



# Arduino-Compatible ESP8266 Wi-Fi

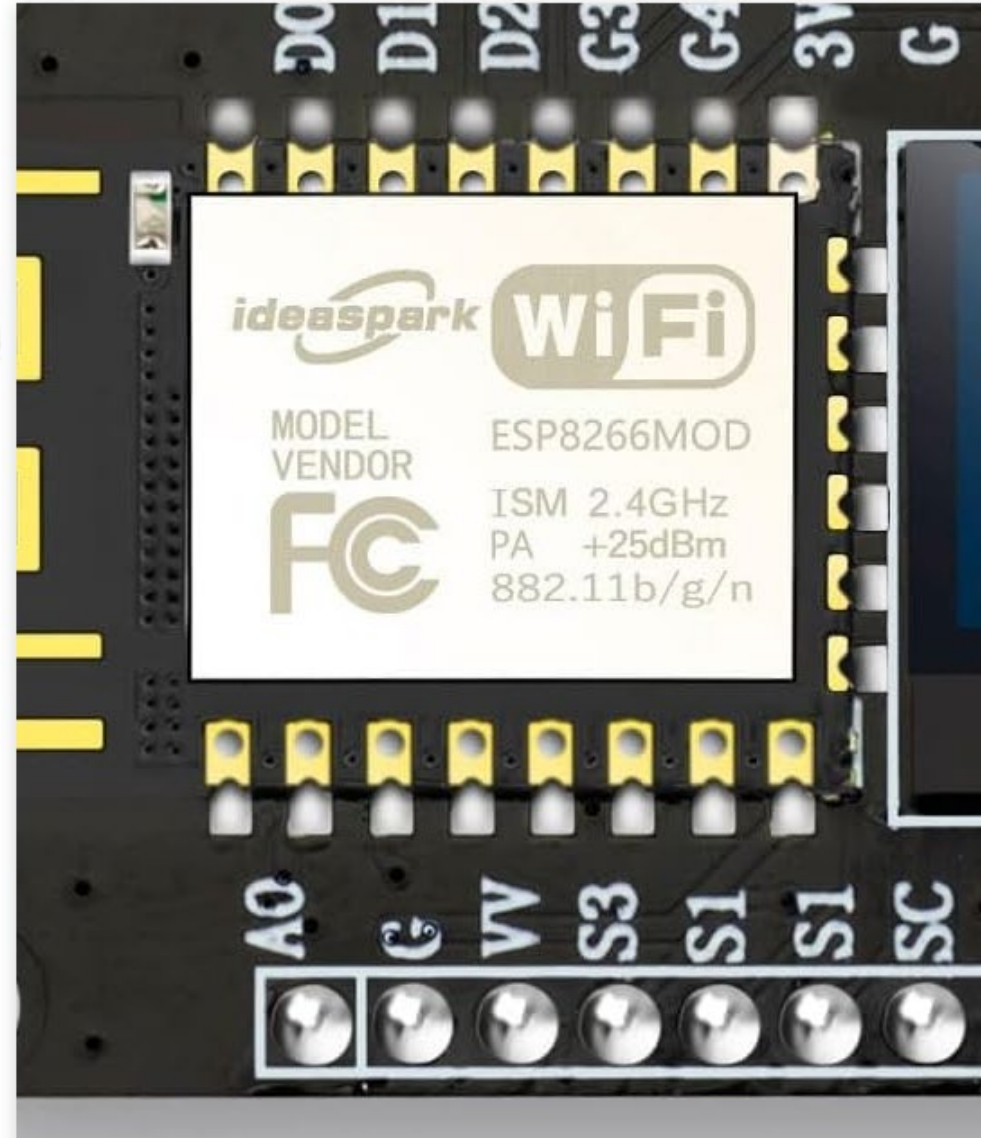




# Arduino ESP8266 Wi-Fi Plus OLED Display For \$12



Roll over image to zoom in



Delivery

Pickup

\$11<sup>99</sup>

✓prime

FREE Returns

FREE delivery Sunday, June 18.

Order within 5 hrs 31 mins

Deliver to David - Pleasant Grove 84062

Only 1 left in stock - order soon

Add to Cart

Buy Now

Payment Secure transaction

Ships from Amazon

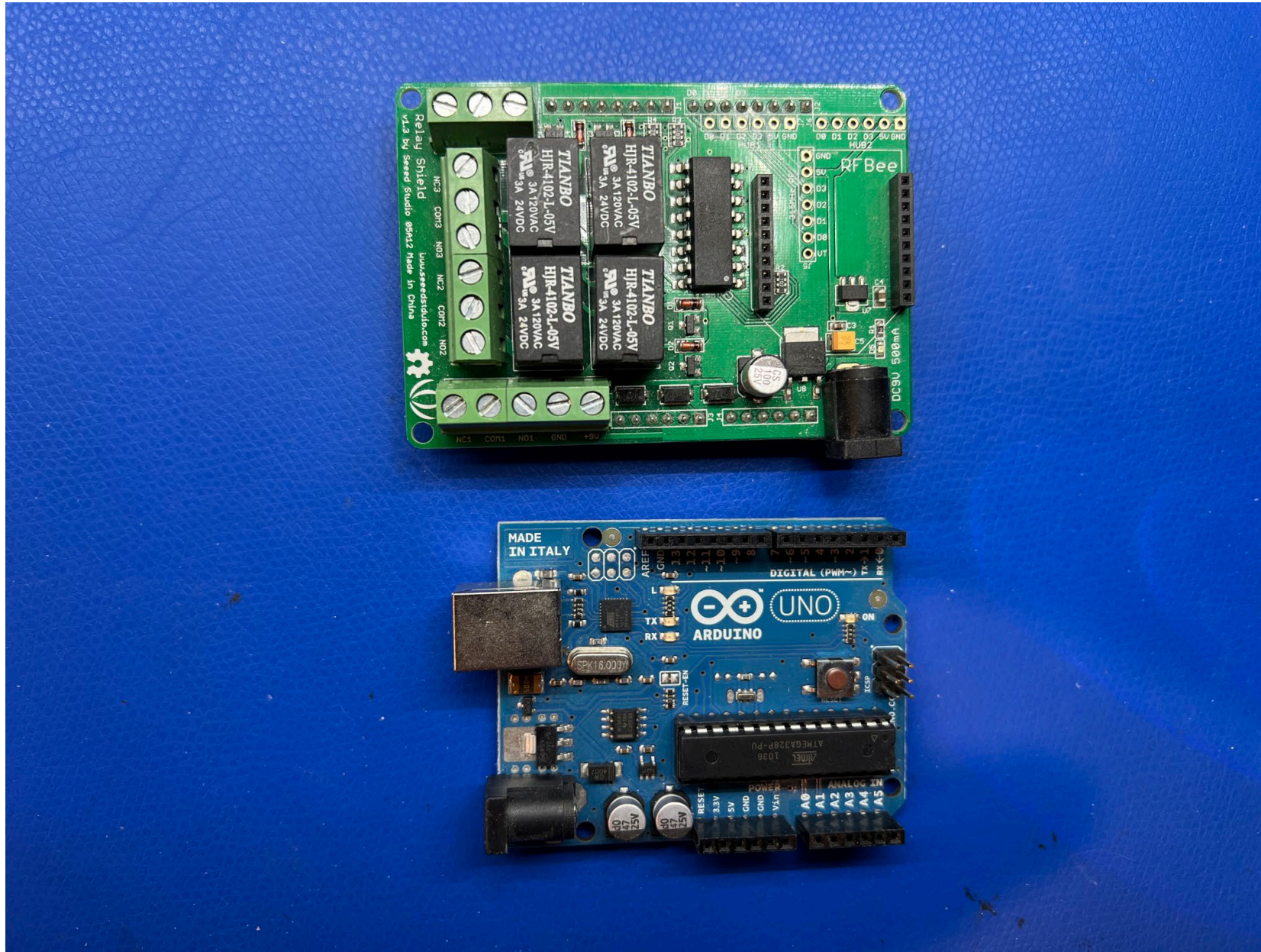
Sold by wideland

Returns Eligible for Return, Refund or Replacement within 30 days of receipt

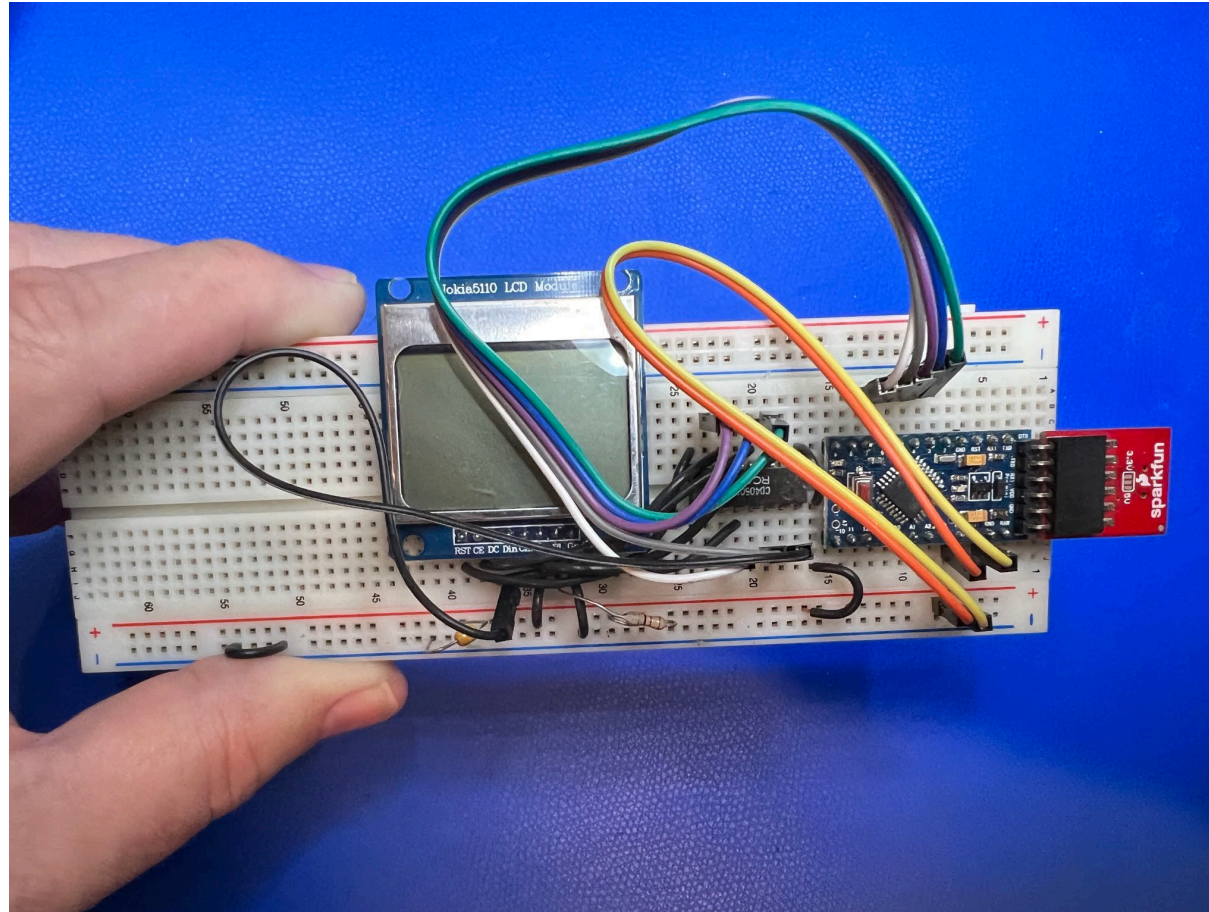
Add a gift receipt for easy returns

Add to List

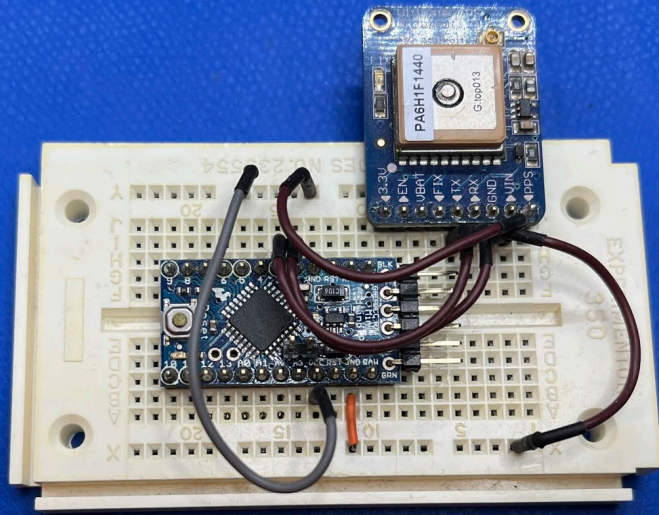
# Pre-Made "Shield" Modules for Arduino Uno



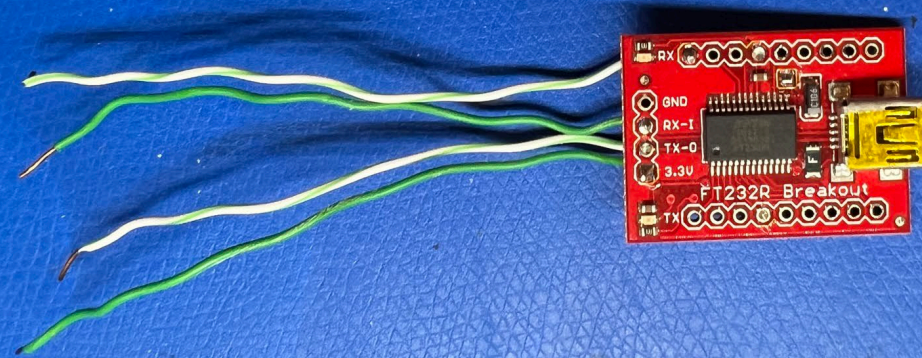
# Make Your Own Shield With Just A Few Parts (and no soldering)



Arduino Pro and Adafruit GPS Module



SparkFun USB Micro to Serial—Plus 3.3V or 5V Power For Your Project



Simple Desktop with TONS  
of pre-made Libraries that  
can get You up and Running  
in just a few Minutes



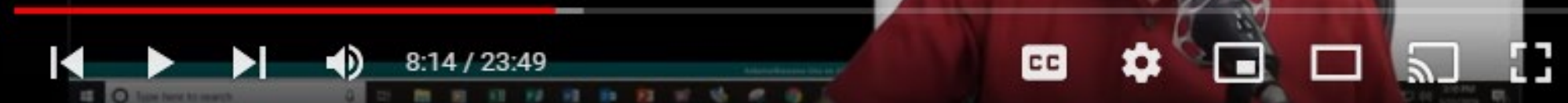
```
sketch_sep25a | Arduino 1.8.1
File Edit Sketch Tools Help

sketch_sep25a
1 void setup() {
2   pinMode(D0, OUTPUT);
3
4 }
5
6 void loop() {
7   digitalWrite(D0, LOW); // Turn the built-in LED on (Note that LOW is the voltage level
8                           // but actually the LED is on; this is because
9                           // it is active low on the ESP-01)
10
11  delay(500); // Wait for a second
12
13  digitalWrite(D0, HIGH); // Turn the LED off by making the voltage HIGH
14
15  delay(500); // Wait for two seconds (to demonstrate the active low LED)
16
17
18 }
```

NodeMCU 1.0 (ESP-12E Module), 80 MHz, 921600, 4M (3M SPIFFS) on COM4


Lots of  
Free Help  
Getting  
Started

```
void setup() {  
  // put your setup code here, to run once:  
}  
  
void loop() {  
  // put your main code here, to run repeat  
}
```



## Arduino Tutorial 1: Setting Up and Programming the Arduino for Absolute Beginners

 **Paul McWhorter** ✓  
330K subscribers

 **Subscribed** ▾

 **58K**

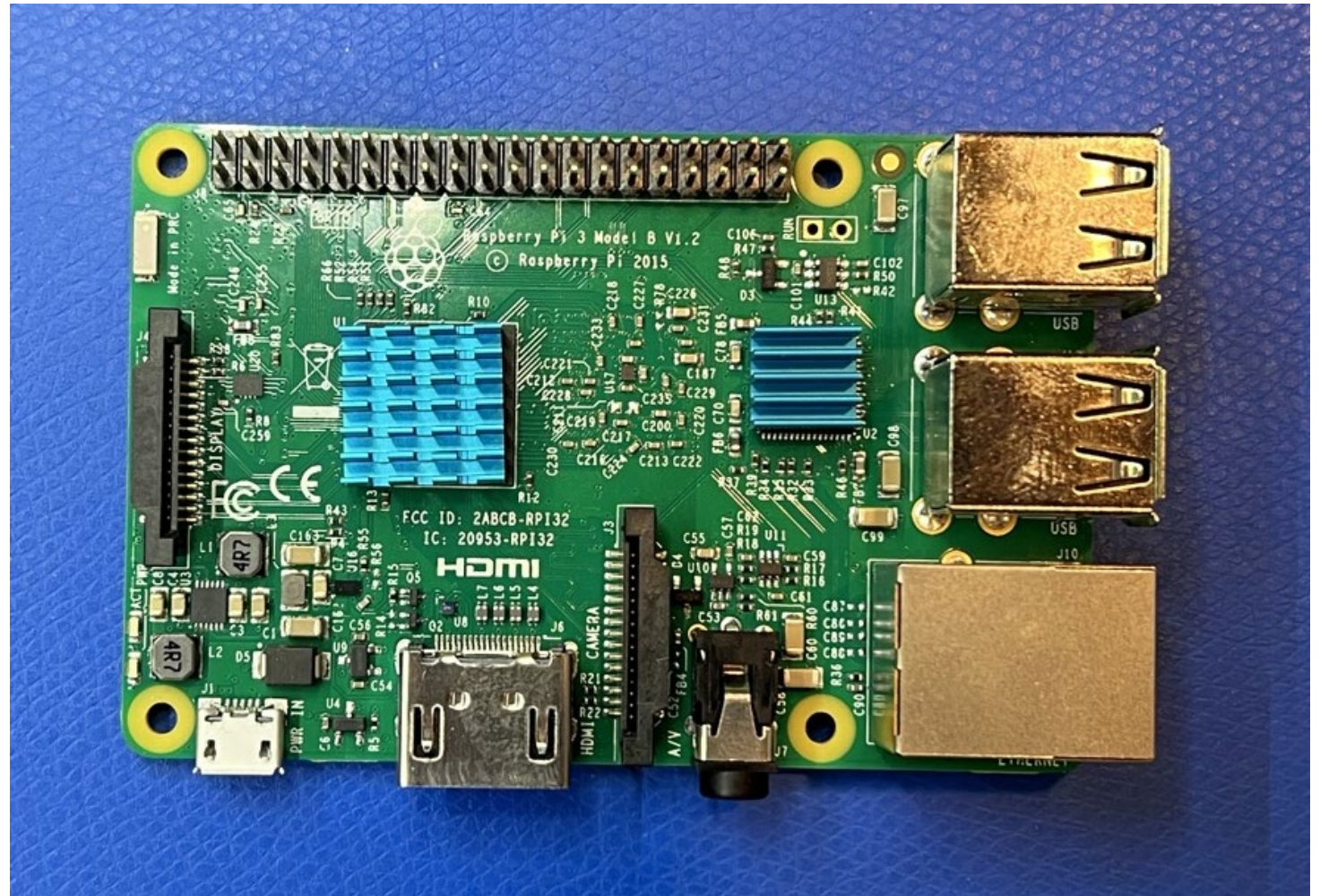
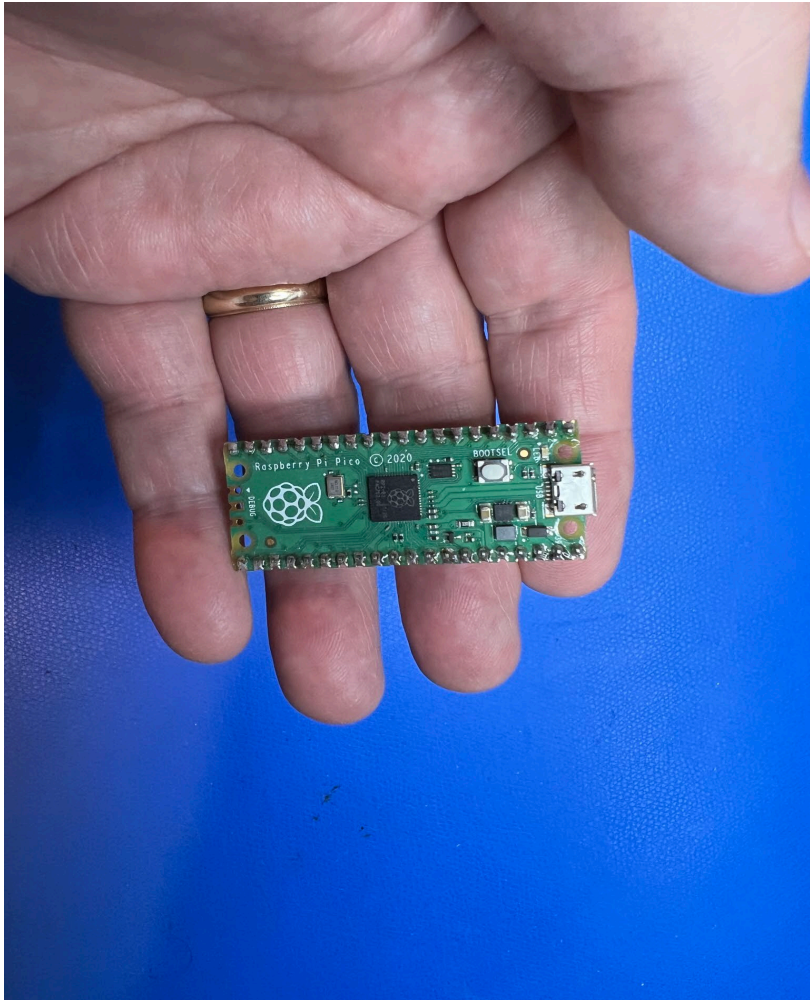
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# Parts Kits Get You Started for Under \$50

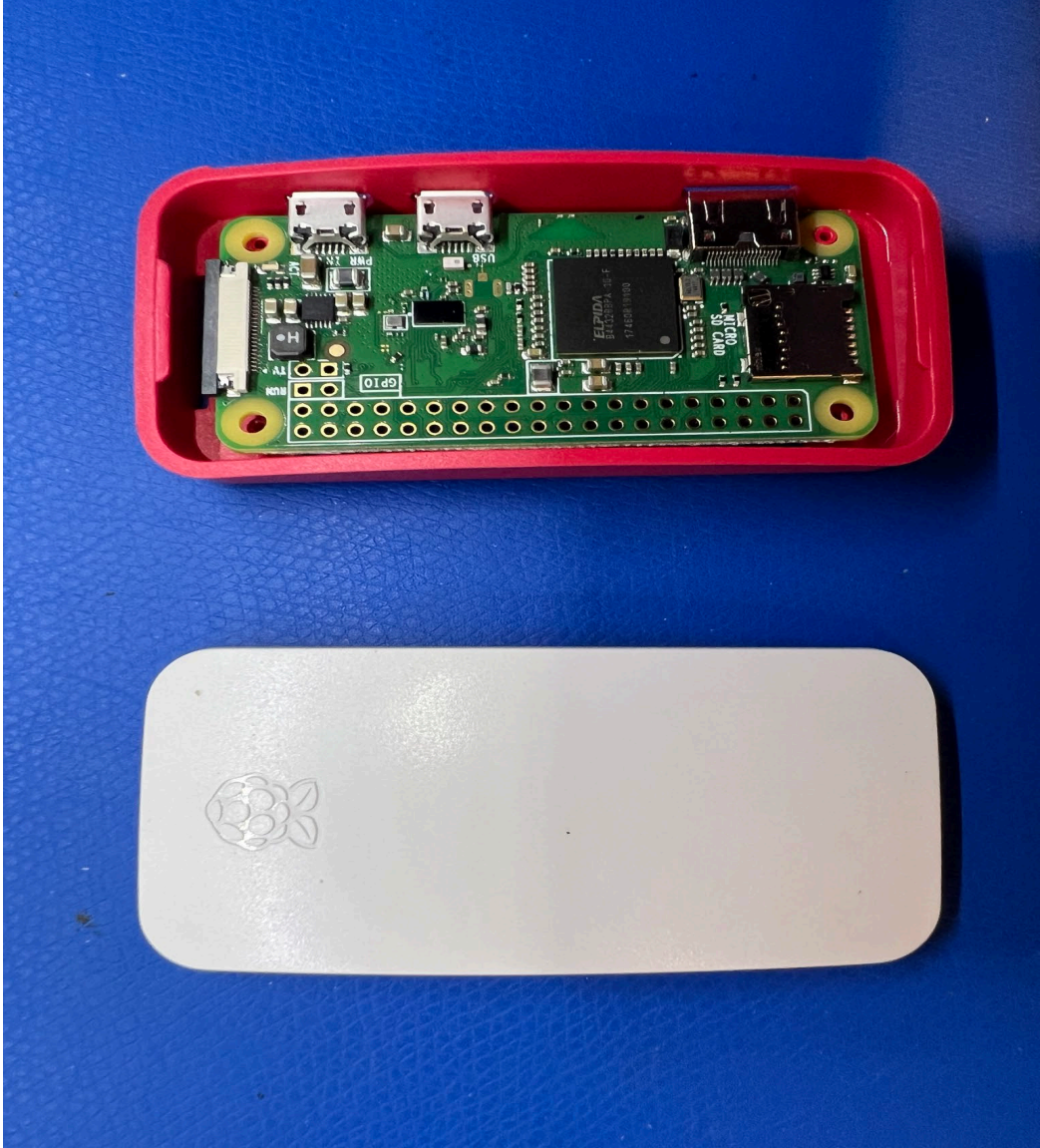


# Raspberry Pi: All Sizes and Flavors Too!





# The Pi Zero—You Might Have One Already??



# Parts Kits for Raspberry Pi As Well!



More Pi  
Help With  
The Same  
Guy!

www.TopTechBoy.Com

Raspberry Pi LESSON 1: First Boot and Configuring the Desktop Environment

**Raspberry Pi LESSON 1: First Boot and Configuring the Desktop, Panel, Menu and Preferences**

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Announcing the Most Awesome Raspberry Pi Lessons of All Times! This time we RUMBLE!

# Which is Better: Arduino or Pi?

- Cost
- Ease of Programming
- Computing Power
- Quick Setup
- On-Line Help
- Pre-Made Libraries
- Expandability

- My Favorite Sources for Parts, Ideas, Tutorials, Help:
- Amazon (make sure to read the reviews!)
- eBay
- AdaFruit: <https://www.adafruit.com/>
- SparkFun: <https://www.sparkfun.com/>
- YouTube: <https://www.youtube.com/@paulmcwhorter>
- Arduino: <https://www.arduino.cc/>
- Raspberry Pi Foundation: <https://www.raspberrypi.org/>