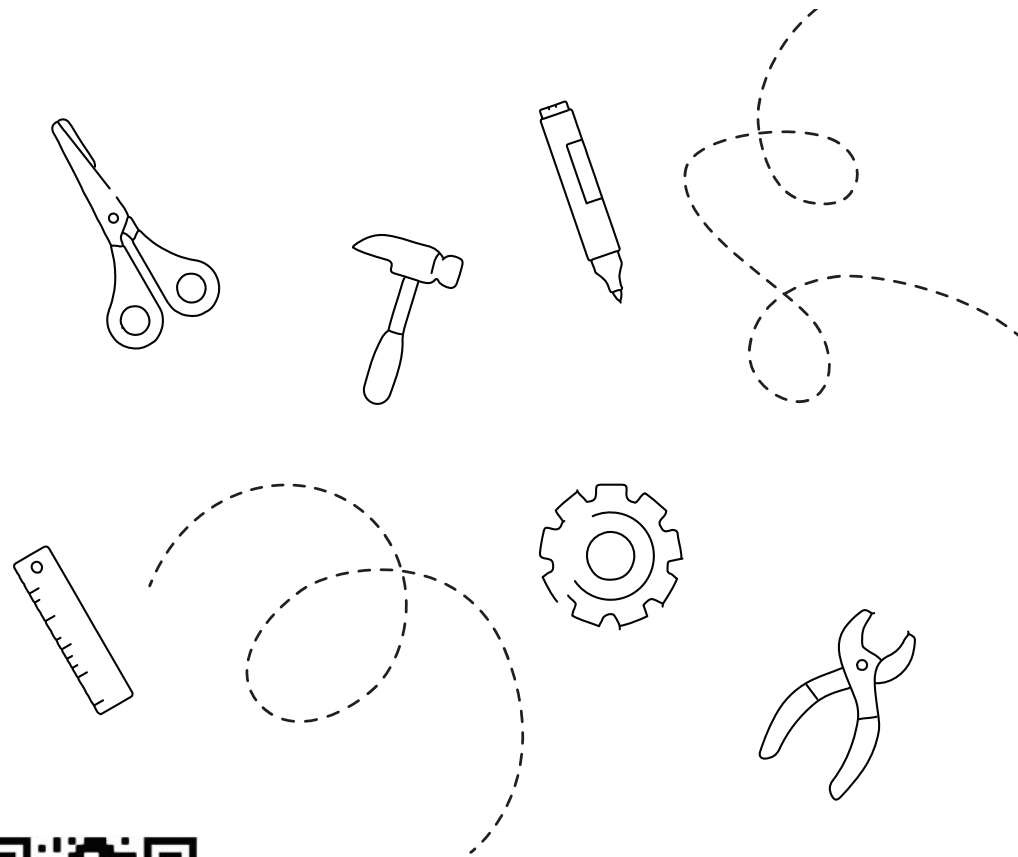
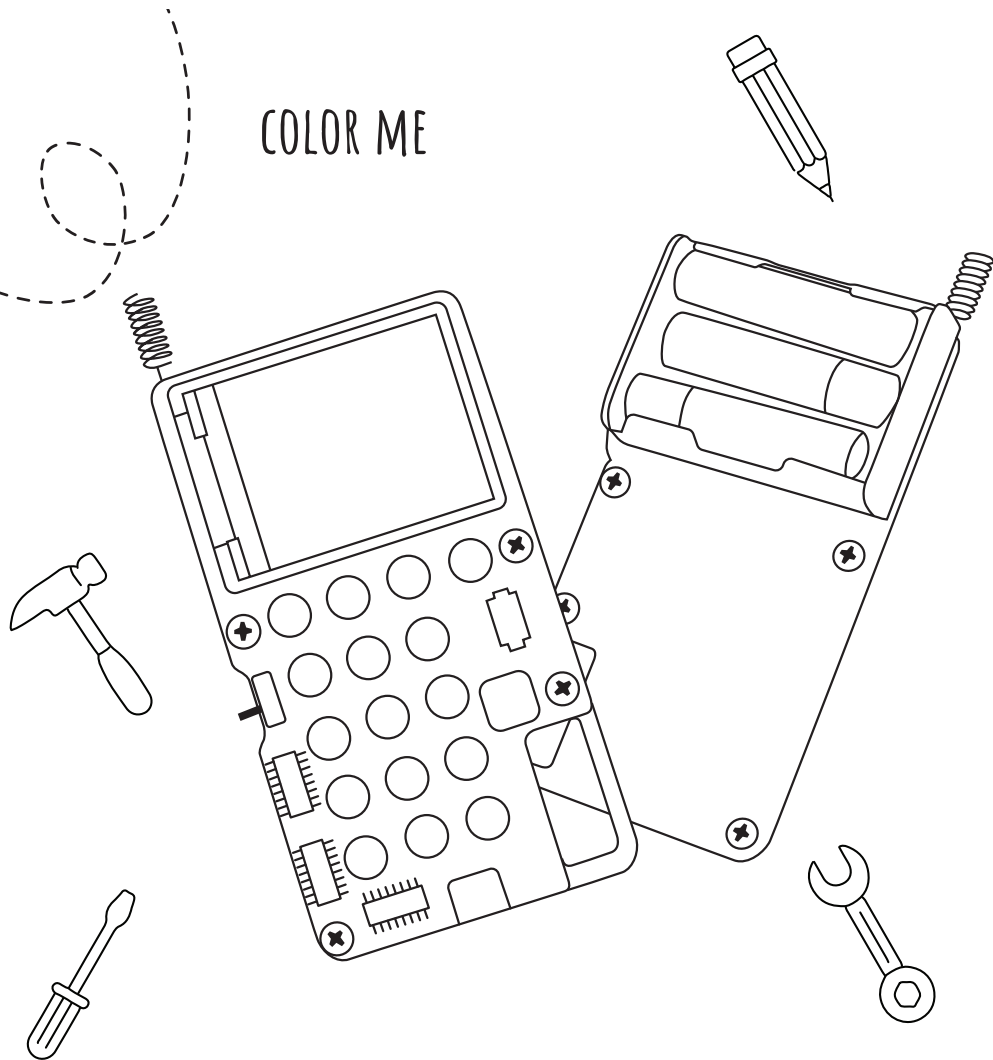


CHATTER 2.0 BUILD GUIDE



 **CircuitMess**

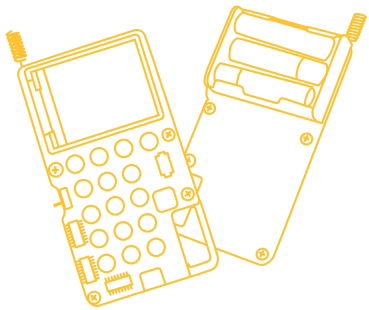
COLOR ME



Prefer video instructions?

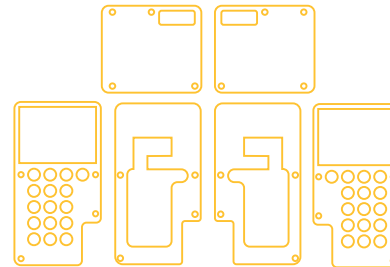
Go to:
circuitmess.com/chatters-build-guide

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Meet the Chatters

- 7 How does it work?
- 8 What's inside the box?
- 9 Wireless — a brief history
- 11 Let's learn about electronics!



Assembly

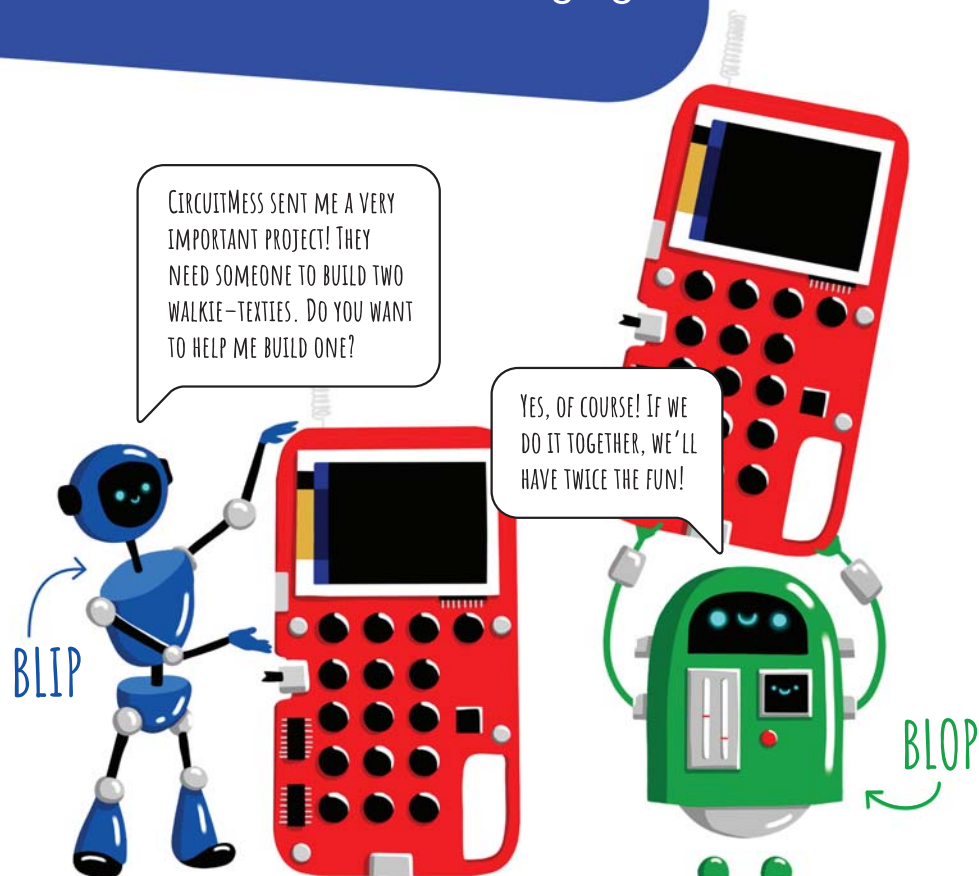
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Meet **CircuitMess Chatters** DIY walkie-texties for messaging



6

Chatter is a DIY walkie-textie that you can build & code on your own.

GET IT?
IT'S LIKE A WALKIE-TALKIE
BUT FOR TEXTING

How does it work?



1. BUILD & LEARN

Easy-to follow instructions will teach you the skills of the future



2. PLAY & TEXT

Text friends, send memes, set high scores on built-in games



3. LEARN CODING

Code custom games & apps. Free lessons & extra content available online

7

What's inside the box?



Circuit board
x2



Display board
x2



Battery holder
x2



Batteries
x6



Black screws
x16



Silver screws
x4



Button caps
x32



Screwdriver
x1



Stand-offs
x8



USB cable
x1



Instruction booklet
x1



Acrylic casings
x6

How did the world go wireless? — A brief timeline



1888

Heinrich Hertz experimentally proves the existence of radio waves, which can be used to carry signals in wireless communication.

1897

Guglielmo Marconi successfully demonstrates wireless communication with his invention of wireless telegraphy.



1900 — 1990

Lots of research and development is being done in the field of wireless technology for military purposes. At the same time, wireless communication is also expanding into a commercial sphere, in a form of Radio and TV broadcasting.





The 1990s

The wireless revolution takes place! We're talking cellular networks, computer networks Bluetooth, Wi-fi... What a time to be alive :)

2022

CircuitMess launches Chatter. Now you can actually assemble and code your own wireless communicator in a fun and simple way!



Let's learn about electronics!

PCB stands for a Printed Circuit Board.

WHAT DOES IT DO?

The circuit board has two functions:

1. It holds all the electronic components in place.
2. It provides electrical connections between the electronic components.

WHAT ARE THOSE TINY LINES ON THE CIRCUIT BOARD?

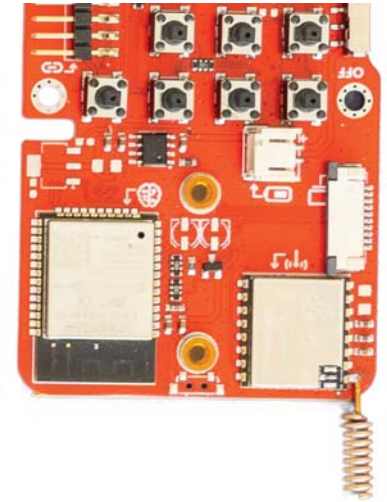
They allow electrical charges to flow between components. This way, electronic components are powered and can do clever stuff using electricity.

Without it, a buzzer wouldn't be able to vibrate once you receive a text message, the display wouldn't react after any input, and you wouldn't be able to write a message.



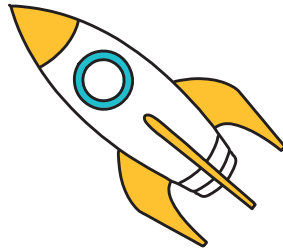
WHERE ARE PCBS USED?

They're used everywhere! In your phone, laptop, refrigerator, and air conditioner. Basically, every electronic device you use has a unique printed circuit board that makes it work.



A PCB is one of the most important inventions of the last 100 years.

Space travel wouldn't be possible without them.



ESP-WROOM-32

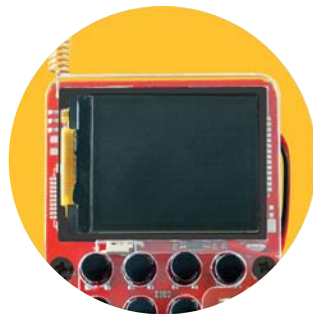
You can think of this as Chatter's brain.

ESP-WROOM-32 is a dual-core processor that makes your device work. It writes images on the screen, responds to button presses, and encrypts/decrypts messages.

DISPLAY

On the display, you'll see the text messages you receive, all the settings, and cool features that you'll get to program in CircuitBlocks a bit later.

The display is an **output component**, while **push buttons** are **input components**. That means that something you write using input components like push buttons, will be shown on an output component like a display.



THE DIFFERENCE BETWEEN A SWITCH AND A PUSH BUTTON

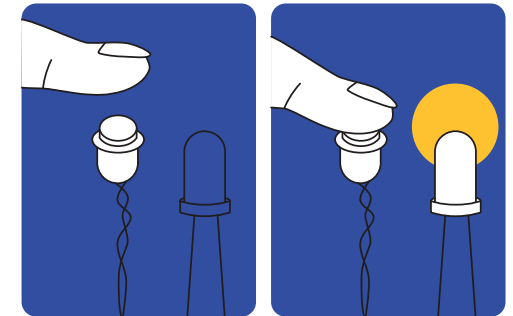
A push button is a small, sealed mechanism that completes an electronic circuit when you press on it.

A small metal spring inside makes contact with two wires when a push button is pressed, allowing electrical energy to flow.

The electrical energy won't flow through the switch when you release your finger from the push button.

A switch controls the flow of power to an electric device — in other words, **it connects and disconnects an electrical circuit.**

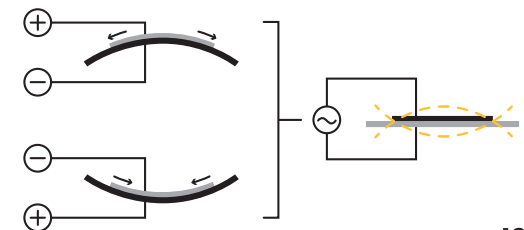
A switch has only an "on" and "off" position and stays in the position, while a button typically refers to something you push and release to close or open a circuit momentarily.



BUZZER

This is an electronic device used to produce a tone, alarm, or sound.

Buzzers are used in alarms, warning devices, toys, PCs, mobile phones...

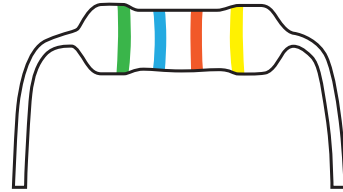


RESISTORS

Resistors are the most basic electronic components found in almost every electronic device.

They fall in the category of passive electronic components.

Passive electronic components don't generate electrical power and don't need electrical power to work. They just modify the flow of electrical energy in their own unique way.



RESISTANCE

Resistors have a property of resistance — they lower the amount of electrical energy flowing through the circuit. They “resist” the flow of electrical energy.

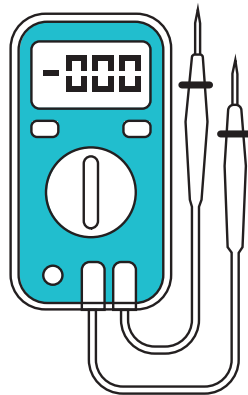
The unit of resistance is called **ohm**, and it was named after German physicist **Georg Simon Ohm**.

Resistors are used for tasks such as adjusting the flow of electricity through an electronic circuit.

A resistor's exact value is measured with an Ohmmeter device.

Let's compare this to something we see in everyday life.

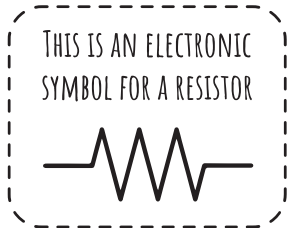
Think of water flowing through pipes. In that



scenario, the resistor would be a thin pipe that reduces the water flow.

To make their work easier, engineers created a set of rules and symbols they use while drawing the blueprints of electronic circuits.

These blueprints are called electronic schematics, and they consist of different electronic symbols.

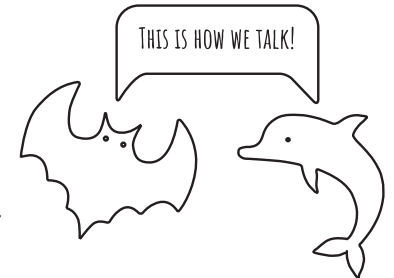


WHAT IS THE LORA TECHNOLOGY?

LoRa (long range) is a shortened term used to describe low-power wide-area network modulation technique used for transmitting radio signals.

Low power means that LoRa-powered devices can work on batteries for long periods of time.

Wide-area represents a physical range of up to 10 km (6.2 miles) in perfect conditions.



WHAT'S THE DIFFERENCE BETWEEN WIFI AND LORA?

Almost all mobile phones, PCs, and TVs are connected to WiFi, enabling you to browse the Internet.

LoRa consumes very little power and is great for transferring small amounts of data (such as text messages) over a very long range.



WiFi consumes much **more energy** than LoRa, providing greater data transmission speeds but has a much shorter range than **LoRa**.

HOW DOES LORA WORK?

The radio signal is transmitted using the chirped, multi-symbol format to encode information.

It works by encoding information on radio waves using chirp pulses.

Time for fun facts!



#1 Do you know what WiFi stands for? It actually doesn't stand for anything! The term was invented by a marketing firm.



#2 According to a survey held on economy travelers, WiFi is more important than breakfast! What do you need more when going on a trip? WiFi or breakfast?



#3 An early predecessor of WiFi was launched in 1971 in Hawaii and was called The ALOHAnet. That was a way better name than WiFi!



#4 WiFi signals are doughnut-shaped!



#5 63% of the world is using the Internet. Now, you're switching to text using LoRa!

It's assembly time!

LET'S START!

It should take you approximately **1 hour of fun** to fully assemble your Chatters.

If you don't have any experience building devices yet, don't worry!

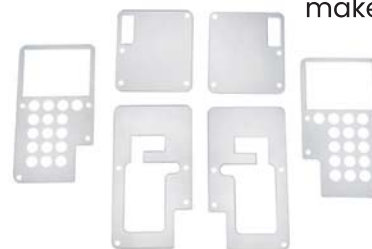
You don't need any specific skills or knowledge to build this DIY project. We'll guide you through all the steps and explain everything. Your only task is to have fun and learn something new.

Note: You can build both devices simultaneously or finish one and then move onto building the other one.

Before doing anything, you'll have to remove the protective layer from the acrylic casings.

The protective layer is the **white nylon** covering the casings.

Protective layers are on both sides of the casings, so make sure to remove them all.



You might need help from an adult because this part can be a little tricky.



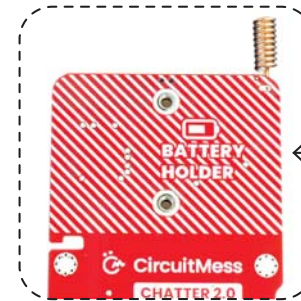
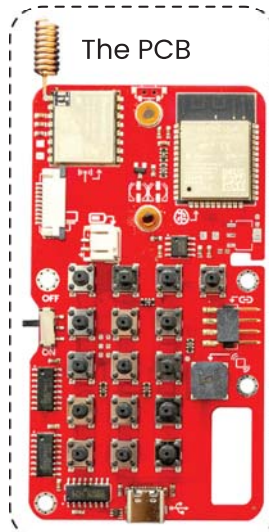
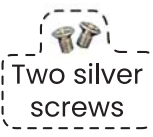
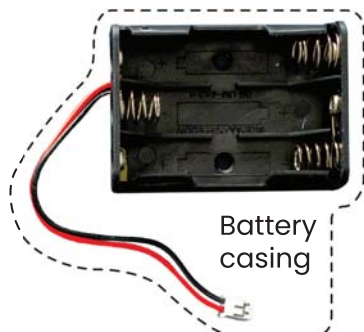


Once you remove all the protective layers, all of your **casings must be see-through**.

This is how your casings should look like once you remove all the protective layers. Once you do this, it's time to **move on to the real business**.

BATTERY CASING

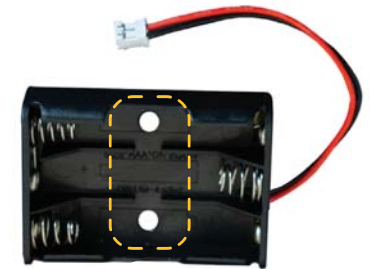
The first components you need are



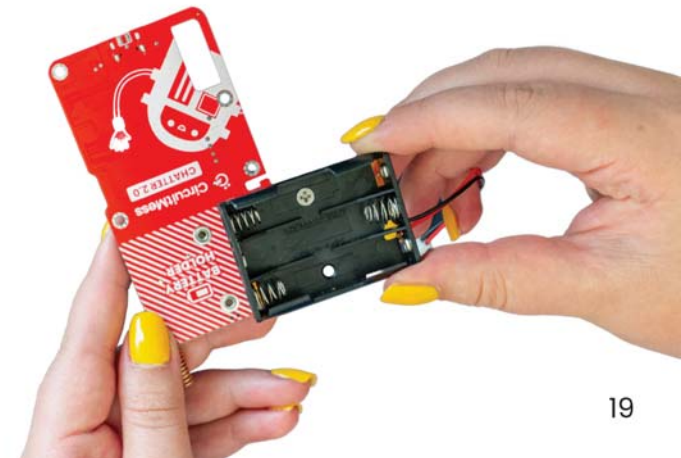
The battery casing will be placed on the back side of the Chatter's PCB.

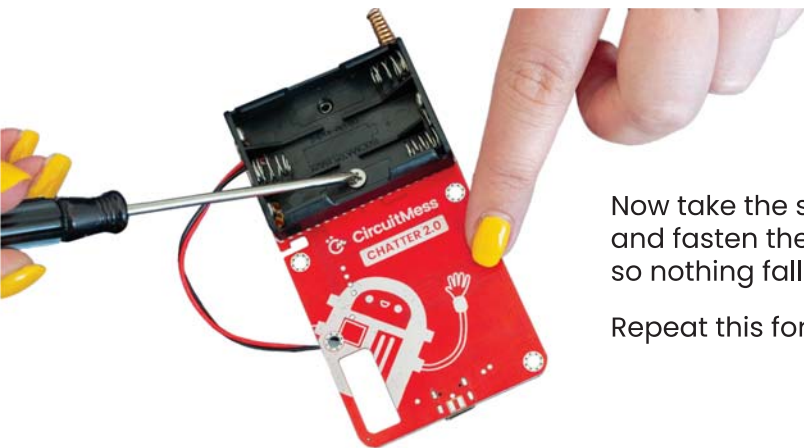
RIGHT HERE

Now, take one of the screws and the battery casing. You'll see two small holes on your battery casing — that's where the screws will go.



Put a screw in one of the holes and place it on the back of the PCB where the battery casing should go.





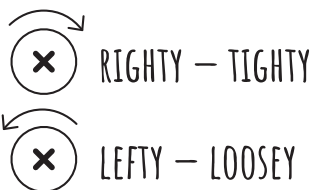
Now take the screwdriver and fasten the screw so nothing falls off.

Repeat this for the other screw.

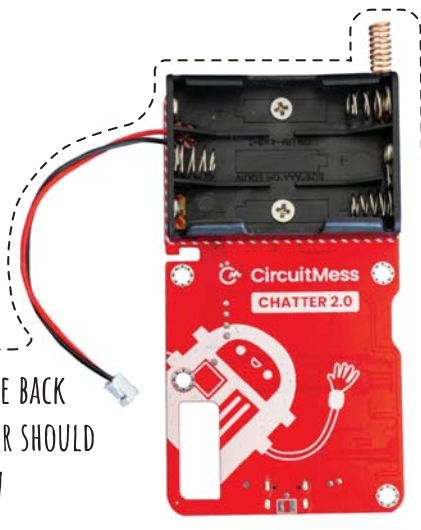
First time working with screws? No problem!

To do your work neatly, you can remember this fun phrase: righty — tighty, lefty — loosey!

To tighten, you turn to the right (clockwise). To loosen, you turn toward the left (counter clockwise).



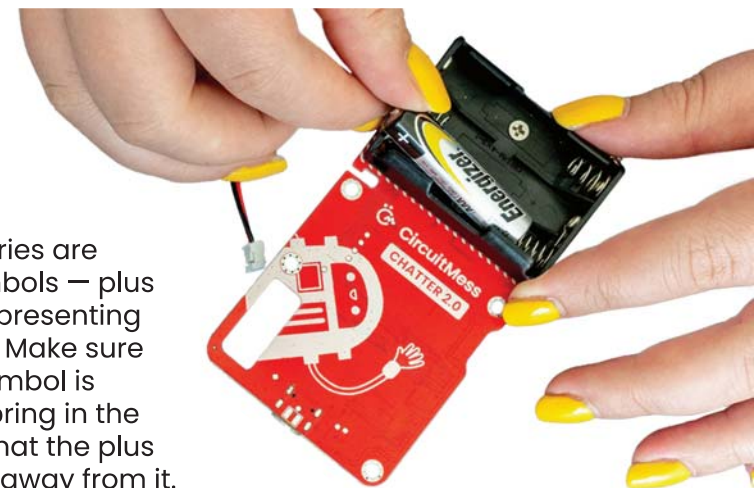
THIS IS WHAT THE BACK OF YOUR CHATTER SHOULD LOOK LIKE NOW



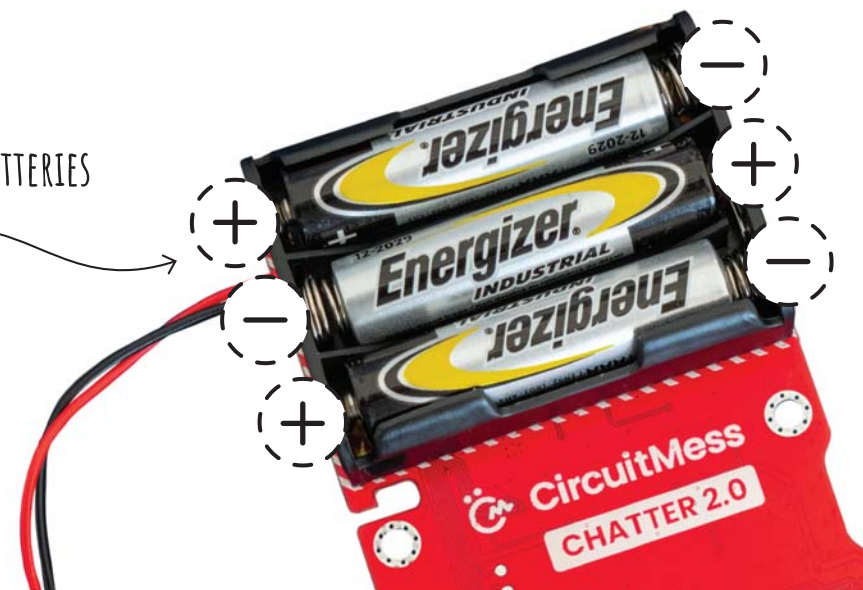
BATTERIES

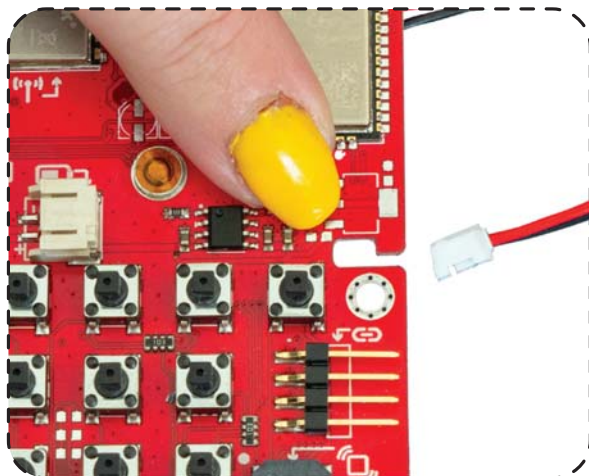
You received six AAA batteries in the kit.

The ends of the batteries are marked with two symbols — plus (+) and minus (—), representing the battery's polarity. Make sure that the minus (—) symbol is placed on the little spring in the battery casing, and that the plus (+) symbol is looking away from it.



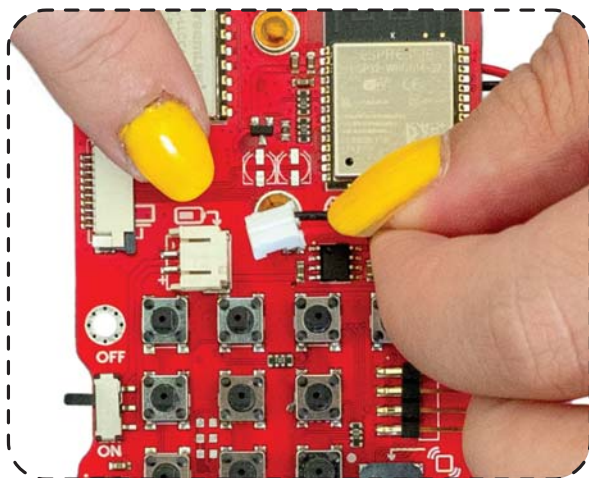
PLACE YOUR BATTERIES LIKE THIS



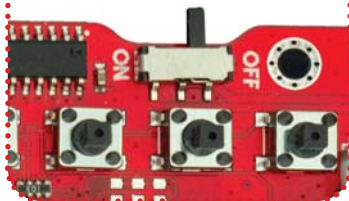


Now, turn your Chatter over to the front side to connect the battery casing to the PCB.

You can see a small part that is cut out of the PCB. You have to squeeze the wires through this part, and then connect the white plastic part into the white slot on the PCB.



WARNING: Make sure that the on/off switch on the left side of the PCB is set to "off".



THIS IS WHAT YOUR CHATTER SHOULD LOOK LIKE →



We'll leave the PCB to the side for a few moments and let's move on to the next components you need.

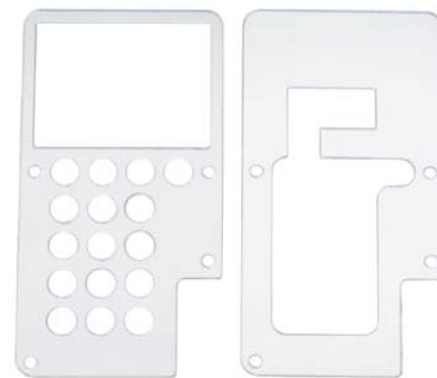
Grab:

The two largest acrylic casings

Four black spacers



Four black screws



Put the casing with a lot of small circular holes on top of the other casing.

Tip: See those fun cards you got in your box? You can use them to customize your Chatter with fun designs. There are cards for both the front and the back casing.

If you want to use one of the cards on the front side, you have to put it in between these two casings before screwing them together.



Take one screw and one spacer. The spacer will go to the backside, and the screw will go to the front of the connected casings.

JUST LIKE THIS →



Repeat this until there are screws and spacers in all of the four holes on the back of the Chatter.

If everything is on tight, you did an amazing job!

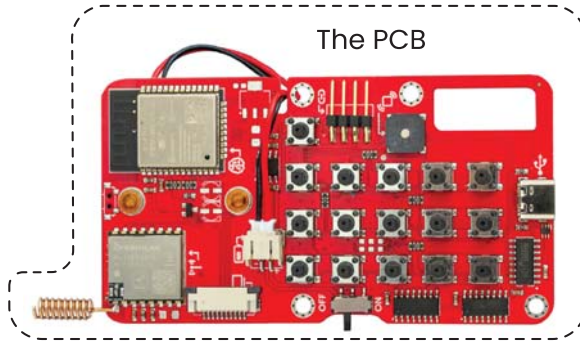
BUTTON CAPS INBOUND!

For this part you'll need:

Sixteen
button caps



The PCB



You'll place the button caps on the push buttons on your PCB.



It doesn't matter which order you put them on. Place them on the top of each push button and make sure they click! Repeat this for all sixteen push buttons.

NOW IT'S DISPLAY TIME.

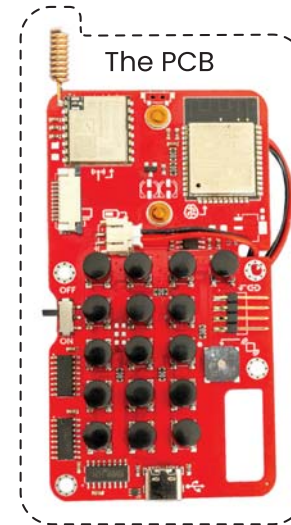
This is a **special task**, and we need you to be very focused!

You'll need:

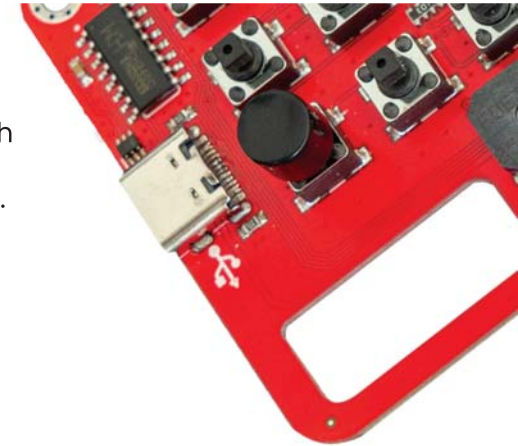
The display



The PCB



The two casings we connected in previous steps

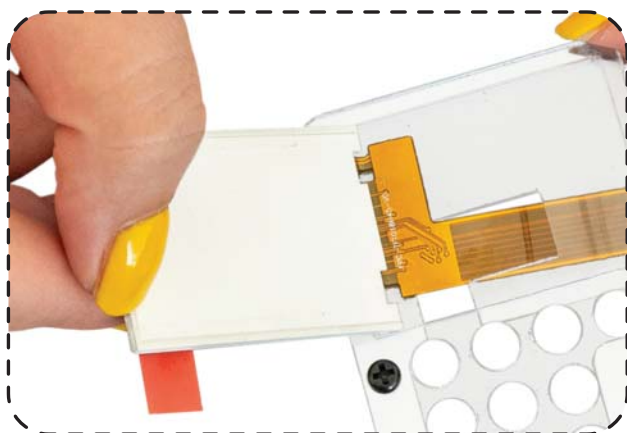




There are **two stickers on the back of your display** that you need to peel off.

How will you know which side is the front?

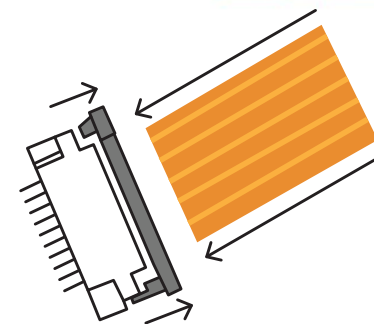
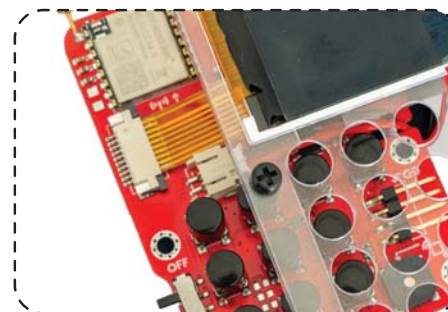
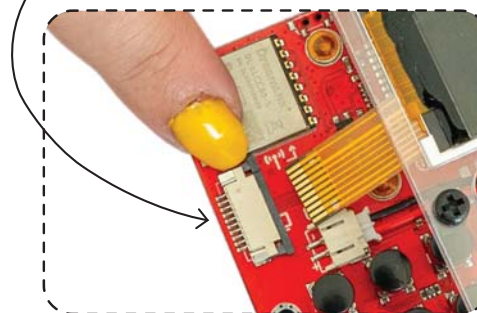
Before sticking on the display, try putting the casing on top of the PCB to make sure you know which side is the front side.



Take the casing and **pull the orange strip connected to the display through the hole in the casing.** Be careful when doing this, don't pull on the strip too hard.

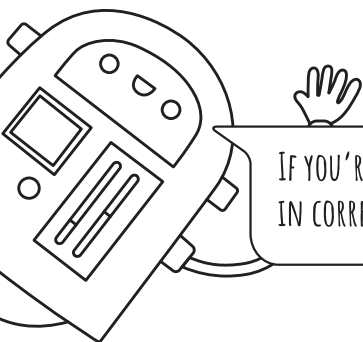
Then, gently stick the display to the casing and make sure it's on there securely.

FIND THE DISPLAY CONNECTOR, IT'S HERE



Slowly pull the dark grey part out of the grey slot, but **make sure not to pull it out entirely.** Pull it out just enough so that the orange strip connected to the display can be placed inside.

Push in the orange strip.



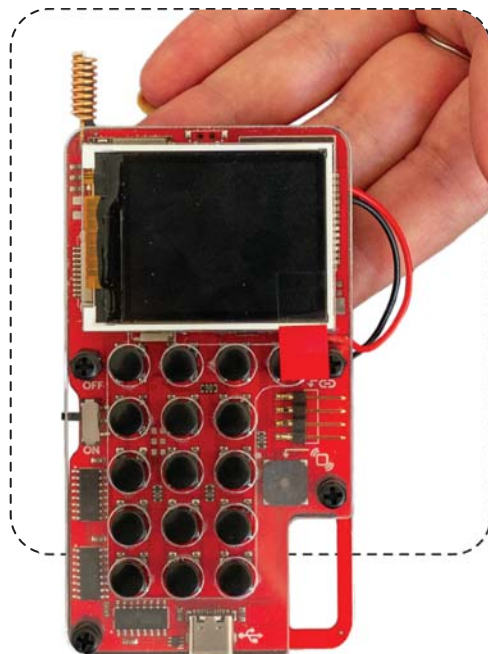
IF YOU'RE NOT SURE WHETHER YOU PUT THIS IN CORRECTLY, ASK AN ADULT FOR HELP!

Now, push in the **gray part back to where it was before and make sure it clicks back.**

Yay! You connected the display. Great job!



PREFER VIDEO INSTRUCTIONS?



THERE IS ONLY ONE CASING LEFT

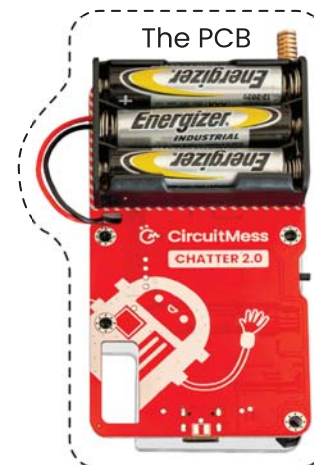
In this final step, you'll use:



Four black screws



Acrylic casing



The PCB



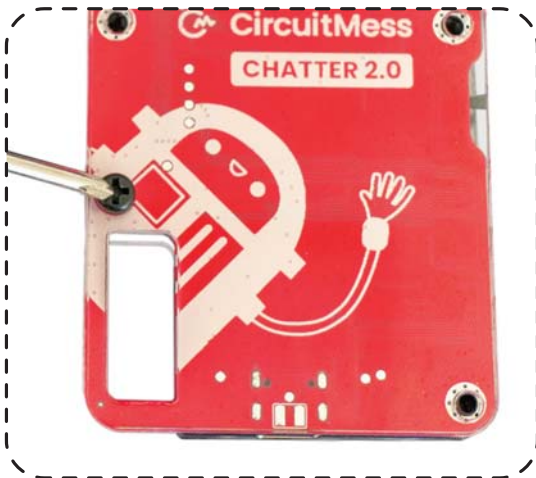
Screwdriver

Note: Remember that you can use one of the custom cards here as well!



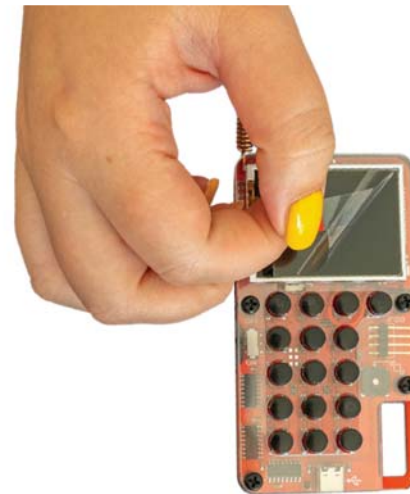


Align the casing with the PCB and put screws into the four holes on the casing.



Pick up the screwdriver and tighten them.

WARNING: Don't tighten the screws too hard because your casing might break.



There's only one thing left to do before you're done!

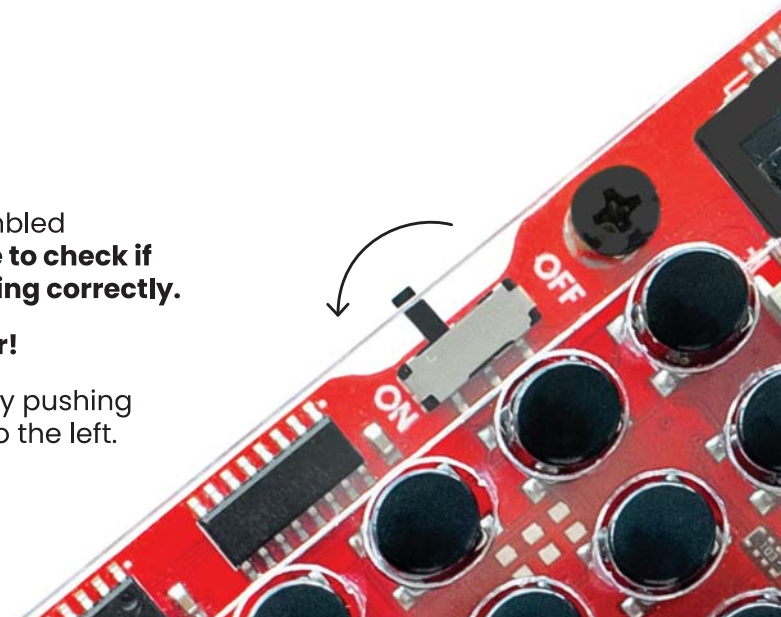
If you haven't done this yet, now's a good time to peel off the **protective layer** from the screen.

INITIAL TEST

Now that we assembled everything, it's **time to check if everything is working correctly.**

Turn on the Chatter!

You can turn it on by pushing the on-off button to the left.





After your Chatter turns on, you will see the first test.

The first test looks like this and is used to **check your buttons**.



You'll need to press **every one of the push buttons**. If a button is working correctly, **the circle** on your screen **will turn green**. You can see what everything should look like in the following photos.



Once you make sure all of the buttons are working, **you'll hear a sound coming out of the buzzer**.

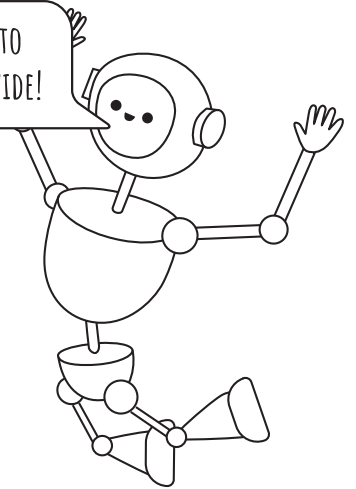
If you hear that sound, you can **press any button** to finish the test and start the device.

If everything is alright, you should see Chatter's menu looking like this

In case you experience any trouble while doing the hardware test, send us an email at **contact@circuitmess.com** so we can troubleshoot and help!



CONGRATS! YOU MADE IT TO THE END OF THE BUILD GUIDE!



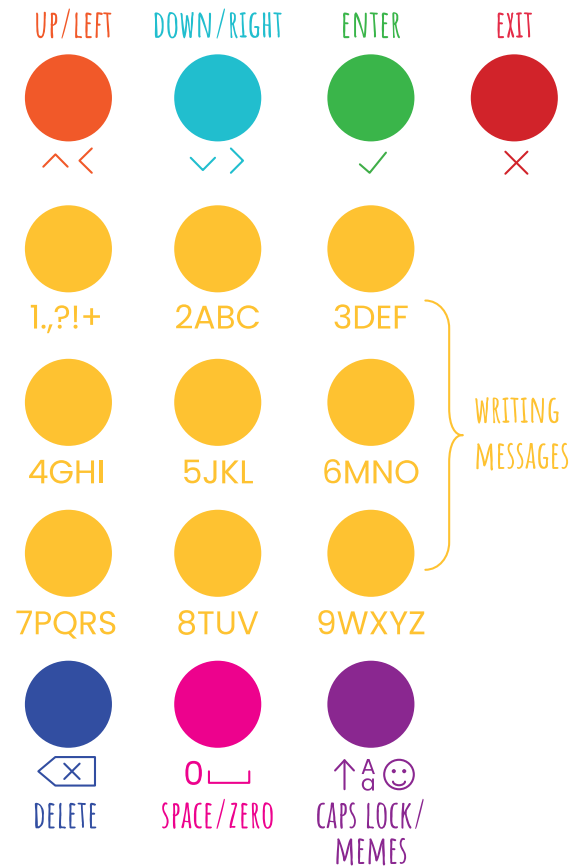
If you were assembling both of your Chatters simultaneously, you're now done!

If you decided to build one Chatter at a time, you'll have to repeat all the steps for the second Chatter.

This should not be a problem since you're now a professional maker!

In the following chapter, you'll find out more about Chatter's features and how to use them.

Usage



HERE IS HOW TO WRITE MESSAGES ON CHATTER

You'll do it exactly the way your parents used to write messages on early cell phones. If you press the button once, you'll get the first letter; if you press the button twice, you'll get the second letter, and if you press the button three times you'll get the third letter.

If you keep pressing the **last button in the last row** (the one with the smiley face), you'll get access to a secret **memestash**.

NAVIGATE THROUGH CHATTER'S MENU

Now that you know what each button means, we can **check out the menu!**


You'll first see the **Inbox** represented by an envelope, then the **Friends** section, followed by **Profile**, **Settings** and **Games**.





SETTINGS


In Chatter's Settings, you can adjust the volume, brightness, sleep, shutdown time, and much more.


 **Sound** — Turn the sound on and off.

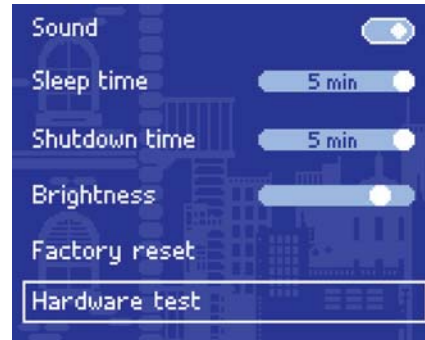
 **Sleep time** — Determine how much time has to pass before your screen turns off when you stop using your Chatter. This feature saves your battery. If your screen turns off, press any button, to turn it back on.

 **Shutdown time** — Determine how much time has to pass before your Chatter turns off. This also saves your battery. If your device turns off, you can turn it on again using the on/off switch or the reset button.

 **Brightness** — Adjust the brightness of the screen.

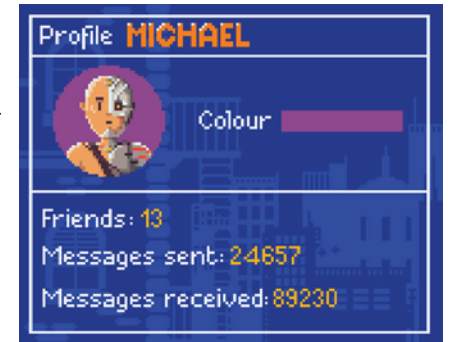
 **Factory reset** — Just like on your phone, this will delete everything from the device including any modifications you might have made.

 **Hardware test** — Perform this test if you suspect some components don't work as they should.



Let's check two other very cool features your Chatter has — creating & customizing your profile and adding friends!

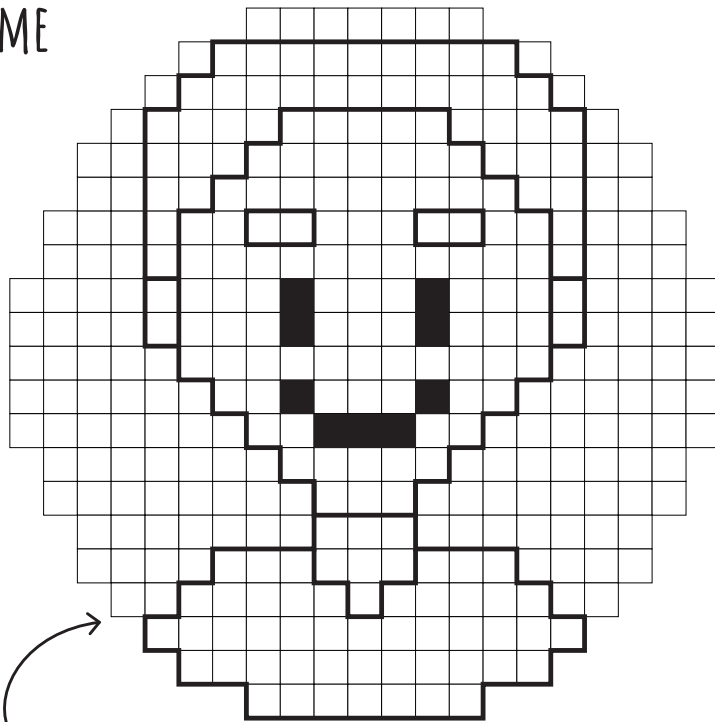
ONCE YOU ENTER YOUR PROFILE, IT SHOULD LOOK SOMETHING LIKE THIS



Here you can enter your name, customize the chat color and your avatar.

CHECK OUT ALL THE AVATARS YOU CAN CHOOSE FROM

COLOR ME



WHAT WOULD YOUR AVATAR LOOK LIKE?

You can change your avatar and chat color by clicking on them and selecting the avatar and color you want. After choosing the avatar and color you want, click the check button once again to confirm the change.

LET'S ADD SOME FRIENDS!

Use the **exit button** to exit the **Profile app** on Chatter, and you'll find yourself back in the **Menu**.

Find the **Friends app**, and enter it.

To add a friend to your Chatter, your other Chatter must be near and searching for a friend.

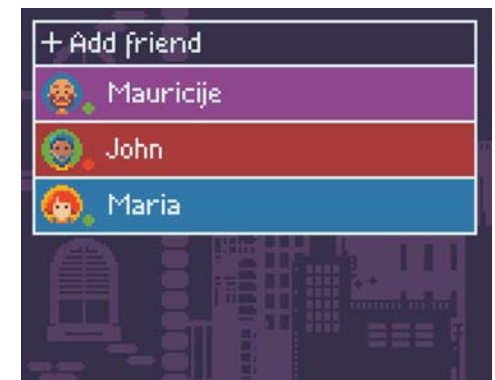
Once you enter it, the screen looks like this:



BEFORE YOU ADD FRIENDS



AFTER YOU ADD FRIENDS





Chatters will do a quick scanning and find the nearest friend!

BOTH CHATTERS NEED TO BE SCANNING FOR A FRIEND SIMULTANEOUSLY



Before you become friends, you'll need to add each other (just like on Snapchat).



Once you add each other, Chatters will pair you.

You'll see a "Pairing successful" pop-up message, and voila!

You have a friend now!

LET'S TEXT!

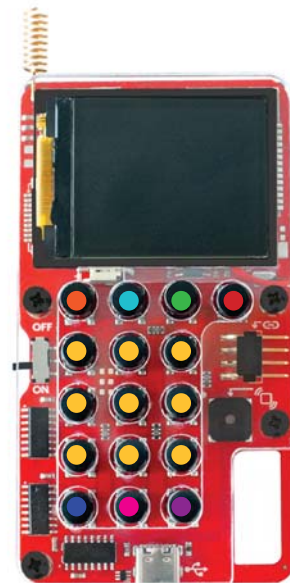
Last but not least, we'll check out what we can do in the Inbox!

If you have a text history with your friend, you'll see your text thread immediately.

If that's not the case, you can start a chat with your newly-added friend.



ONCE YOU START CHATTING, YOUR SCREEN WILL LOOK LIKE THIS



- | | |
|--------------|--------------------|
| ● UP/LEFT | ● WRITING MESSAGES |
| ● DOWN/RIGHT | ● DELETE |
| ● ENTER | ● SPACE/ZERO |
| ● EXIT | ● CAPS LOCK/MEMES |



As you can see, there is a small **filled and unfilled circle** next to the message. When the circle is filled, that means the text was delivered, and if the circle is unfilled, that means that your text was not delivered.

If the text was not delivered, it's probably because the other Chatter is too far away or turned off.

You can fix that by clicking on the undelivered message and choosing the **"Resend message"** option! There is even an option to **delete the text** you might have sent by accident.

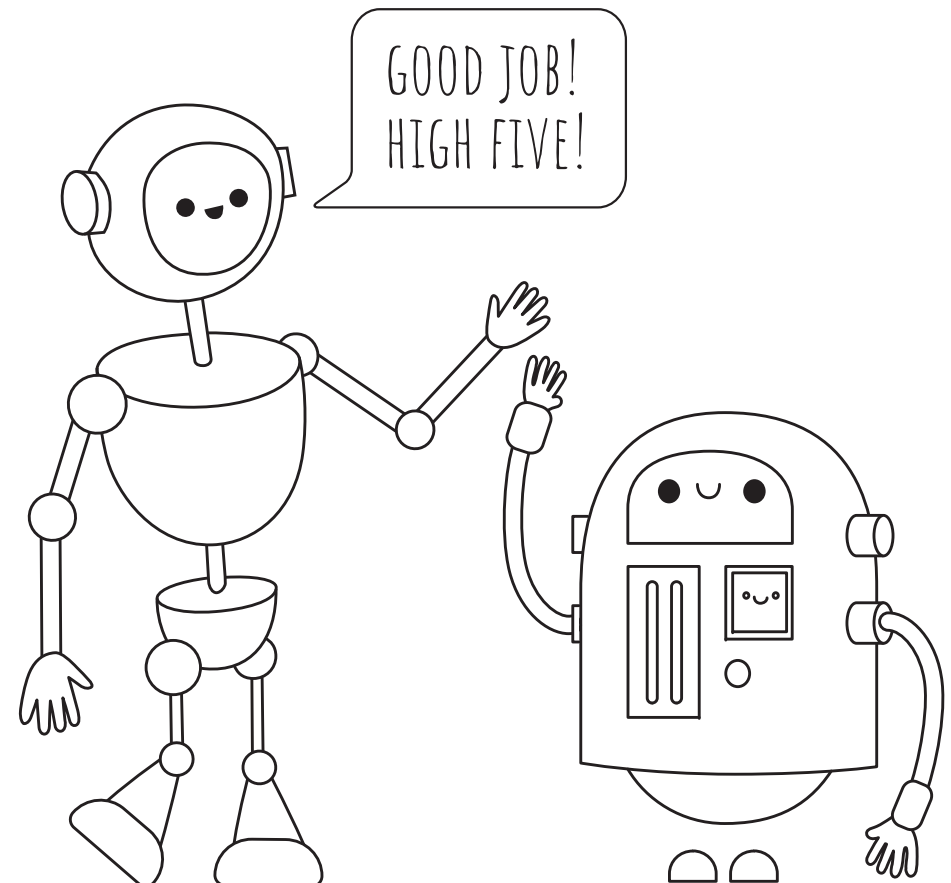
And the last thing you need to know is how to add **memes** to chat.



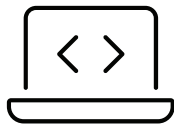
Do you see the last **button** in the last row? The one **with the smiley face?** Great!

Press and hold the button down for a few seconds. This will open a **secret meme stash** on your Chatter. Browse through the memes and have fun using them!

COLOR ME



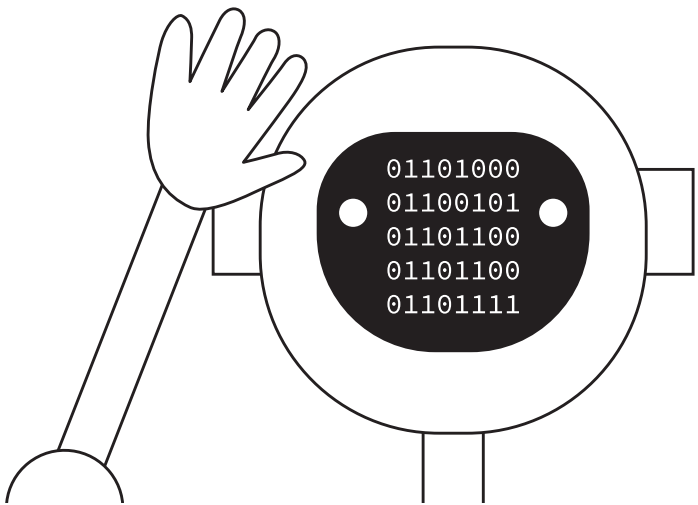
ARE YOU READY FOR THE NEXT STEP?



Now that you know how to use your Chatters, it's time to code them.

Open up your laptop and head to:

CIRCUITMESS.COM/CODE



FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Remarks: BT and WiFi module part of this prototype is not used, has been shielded by software.

