

ByteBoi Build Guide

Introduction

The beginning

Welcome to CircuitMess ByteBoi build guide!

By following this build guide, you'll learn how to assemble your retro game console. With ByteBoi you'll learn how to create your gaming device, how video game consoles work, how to code your own video game, and how to animate characters. Also, you'll learn how to interface ByteBoi with your Wheelson.



Age group

Like it says on the box, ByteBoi is designed for anyone who's at least **11 years old**.

You should approach some of the assembly steps carefully, so make sure to have an adult jump in if you need some help with soldering or tightening the bolts later in the process. It's okay to ask for help.

Don't worry, though! We'll go through the assembly step by step and provide some useful tips along the way. We'll give you a heads-up if there's something important to keep in mind while assembling.

Assembly time

It should take you approximately **5 hours** to fully assemble your ByteBoi.

Of course, the assembly time depends on your previous knowledge and experience. If you don't have any experience yet, don't worry! It just might take you a little longer to get into the groove and overcome the challenges in the beginning.

Skills

You don't need to have any specific skills before getting your hands dirty with this DIY project.

The main objective here is to have fun and learn something new.

So hold on tight, read all the instructions, and get ready to have fun! This is a great opportunity and your first step in your big engineering career.

Learning with ByteBoi

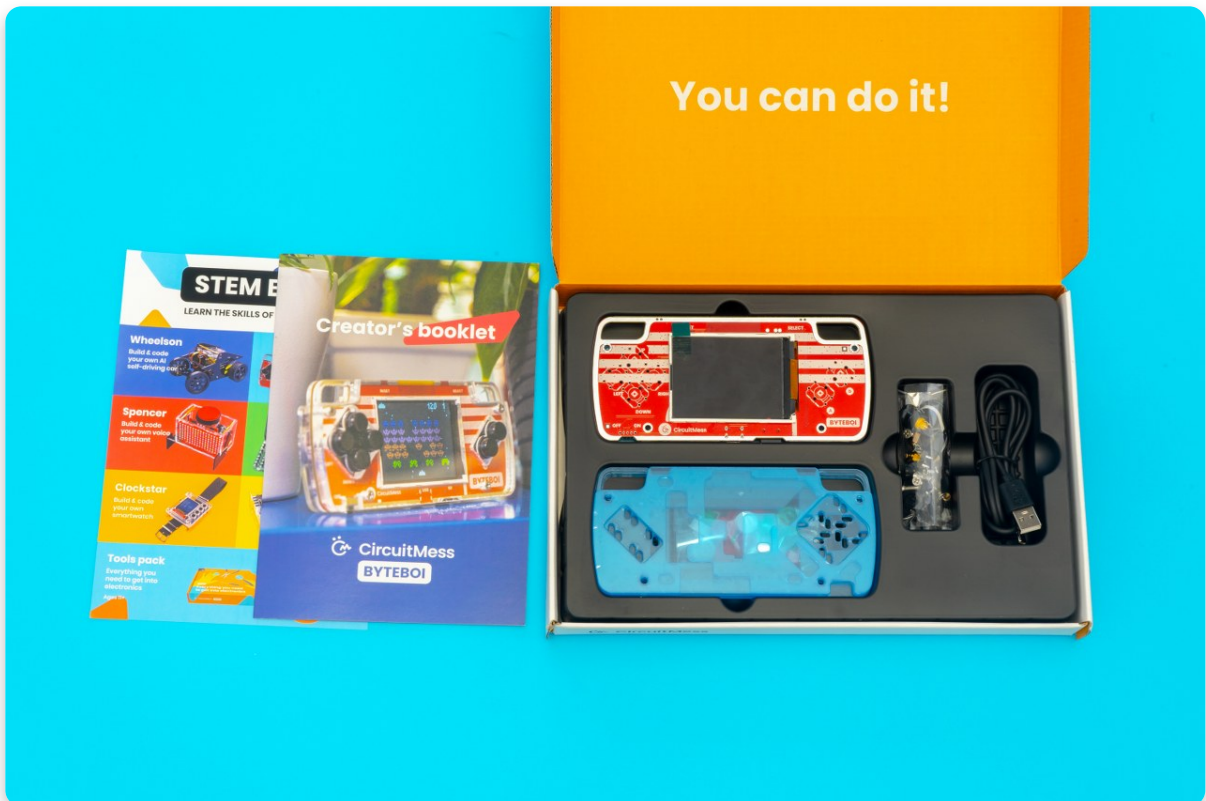
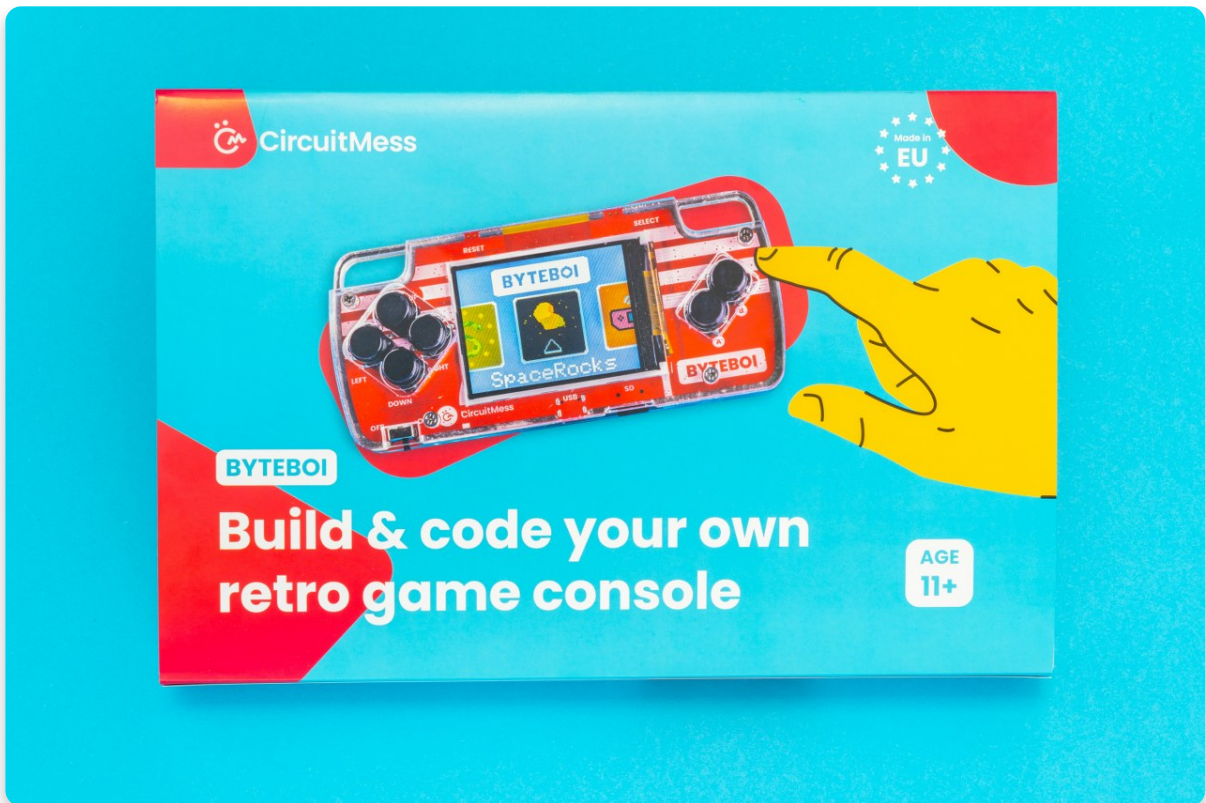
As previously mentioned, ByteBoi will teach you a few useful things in the following few hours.

Here's what you'll learn:

- How to assemble you own gaming device
- How video game consoles work
- How to code your own video game
- How to animate characters and simulate physics in a video game
- How to interface your ByteBoi with your Wheelson

What's in the box?

Let's meet all the components that arrived in the box!



Open your ByteBoi box and check if you have all the components. Make sure to lay it all on a clean surface where you'll inspect if everything is there according to the photo and the list below.



In case something is missing, please contact us at contact@circuitmess.com. Send us a photo of everything that came in the box, and we'll get back to you as soon as possible to resolve the issue.

Here's the list of components:

1. **Main circuit board**
2. **Acrylic casing**
3. **USB-C cable**
4. **Li-Po battery**
5. **Pushbuttons**
6. **Button caps**
7. **Screws, bolts, spacers**
8. **Speaker**
9. **On-off switch**

Meet the tools

Mandatory tools

In this chapter, we'll explain what tools you'll need to assemble your ByteBoi.

If you have your **CircuitMess Tools pack** in front of you, you should be all set!

In case you got the ByteBoi kit without the Tools pack, this is a good time to borrow some of the tools or purchase them.

The tools required are essential whenever you assemble, fix, or modify electronic devices and are the tools of the trade for every maker/hardware hacker/modder/electrician.



All the tools from the box

1. **Soldering iron**
2. **Desoldering vacuum tool (solder sucker)**
3. **Soldering iron stand**
4. **A small reel of rosin-cored solder**
5. **Cleaning sponge**

6. Phillips screwdriver

7. Needle-nose pliers

Soldering iron

This is the most important tool in a maker's arsenal.

For ByteBoi's assembly, any entry-level soldering iron will suffice.

If you plan to dive into the world of DIY projects, you should consider getting a more expensive one with more features. Many soldering irons with interchangeable tips can be particularly useful when working with much smaller components.

There are two types of soldering irons you could have received in your tools pack. The first one is white with a temperature regulator, and the second one is blue with a small metal button. Both of them will do the job of soldering the components in place and there is no significant difference between them.

In the next chapter, you'll find the instructions on how to properly solder and take care of both soldering irons.



The soldering iron from the Tools pack

Soldering sponge



This small piece doesn't seem like much until you soak it in some water. It then turns into a super solder-cleaning sponge! Use it after soldering a couple of joints to remove the excess solder from the tip of your iron. Make sure that the sponge isn't dripping wet or bone dry - it should be damp.

Diagonal cutter pliers

With pliers like these, you'll be able to trim the legs of soldered components and cut wires!

We prefer this type shown in the picture (Plato, model 170), but any other type will do.



Diagonal cutter pliers

Needle-nose pliers

You're going to need pliers like these when assembling the casing or when plugging in some tricky connectors!

They're generally helpful when doing some fine mechanical work.



Needle-nose pliers

Standard cross screwdriver

You'll need this cross (Phillips) screwdriver to assemble the casing.

A standard 2.0mm cross screwdriver should do the trick.



Standard cross screwdriver

Desoldering vacuum tool (solder sucker)

This tool is useful when cleaning up soldering mistakes, but it isn't necessary for assembly.

If you plan on doing some hacking, modding, or hardware repairs in the future, having this is always a good idea.



Desoldering vacuum tool

Additional useful tools

Helping third hand with magnifier

This could make your soldering experience a little more enjoyable, especially when doing some more complicated projects.

Helping hand with a lot of additional tools

Multimeter

A multimeter can be used for many things: testing tricky connections, measuring battery voltage, testing resistors & capacitors, measuring the current consumption, and more.

It's a useful tool when you're trying to figure out what went wrong with any electronics kit.

Solder wick

You can use solder wick along with the desoldering vacuum tool to clean up any soldering mistakes. Just put it on the wrongly soldered joint and press on it with a hot soldering iron, then it will soak up the excess solder like a sponge!

Useful for fixing solder joints when they cannot be easily reached with a solder sucker.

Assembly

Soldering introduction

The first thing that you'll do as a part of the ByteBoi assembly process is soldering!

Have you ever done that before? If your answer is no, we suggest you look at the following few links where you'll find useful tutorials and blogs about soldering. It will only take you 10 minutes to get into the zone and understand how it's done. Here are the links:

- [Adafruit's video tutorial featuring Collin Cunningham](#) – A tutorial featuring Collin Cunningham, a super charismatic electronics guru.
- [Adafruit's standard soldering tutorial](#) – A great and thorough video tutorial. An absolute must-read, even if you know how to solder. Make sure to check the “common soldering mistakes” section at the end.
- [Sparkfun's video soldering tutorial](#) – Another well-made how-to-solder video tutorial.
- [Sparkfun's standard soldering tutorial](#) – A detailed tutorial made by Sparkfun.

There are several rules of soldering that everybody, regardless of their skill level, should follow at all times.

- **Never inhale the dust and the fumes that can be produced by the soldering iron!** These can be hazardous, so please don't inhale them.
- **Never touch the tip of the soldering iron!** Even if the soldering iron is turned off or completely disconnected from the power source, there is still a possibility that it's very hot and, therefore, can cause very uncomfortable pain if touched. Always keep it facing away from your hands. If you're finished with the soldering iron, unplug it from the power source and leave it to cool off for at least five minutes before putting it back in the box.
- **Clean the soldering iron!** The sponge is your best friend while soldering. Make sure to use it often and clean your soldering iron if you wish to have an easy and simple soldering experience. Carefully hold one part of the sponge with one hand and wipe the tip of the soldering iron on the other part of the sponge to remove the extra solder. Repeat the process until the tip of the iron is nice and clean from the old solder.
- **Check your solder joints twice (at least)!** Most of the malfunctions in the world of electronics are due to bad solder joints, so regardless if this is your first or 100th soldering project, always make sure to inspect your joints multiple times before proceeding to the next step.
- **Keep the soldering iron on the stand when you're not using it.**
- **Know how much solder is needed!** Make sure to put just enough solder, not too much, and not too little, since both can cause the device to malfunction.
- **Don't leave any residual solder on the board!** The solder should only be on the parts where the pins connect to the board. Everything else should be clean. Little pieces of solder all over the board are a big no-no!

Now go over these rules a couple of times so you don't forget them!

If you follow these rules, your soldering experience should be easy peasy.

Using the soldering iron

The soldering iron is very easy to use but only when used properly.

If you have purchased the CircuitMess tools pack with your ByteBoi kit, you have gotten a white soldering iron with a temperature regulator.

Remember the rules mentioned previously? Good! Let's go over the instructions on how to use the soldering iron now...

Soldering iron instructions

Step 1

Set up your soldering iron so it stands on the stand - as shown in the photo. After that, plug it into a power outlet.

Step 2

Set the temperature to **250°** by turning the regulator. There is a small black arrow next to the regulator wheel, so make sure that it points to the right temperature, like in the photo.

Your soldering iron is now ready to use, but give it a minute or two, so it can heat up. The safest way to let it heat up is to leave it on the stand while you wait!



Set the temperature to 250°

Step 3

Once you're done with soldering (don't worry, we'll let you know when that time comes), you'll unplug the iron from the power outlet to turn it off.

Please use the soldering iron stand every time you are not using the soldering iron to make sure you don't burn the surface or the circuit board!

Make sure to not touch the soldering iron tip for at least five minutes after you have turned it off.

Chapter one - Soldering the components

Now you know how to solder, let's put it to the test. Ready?

Part one - Soldering the components

Before soldering, **please remove the battery from the circuit board!**

You can see that the battery is connected to the circuit board with the white slot.

Carefully pull the battery from the slot, but make sure not to pull it by the wires. If you pull the battery wires, they could easily break.



Did you do it? Great!

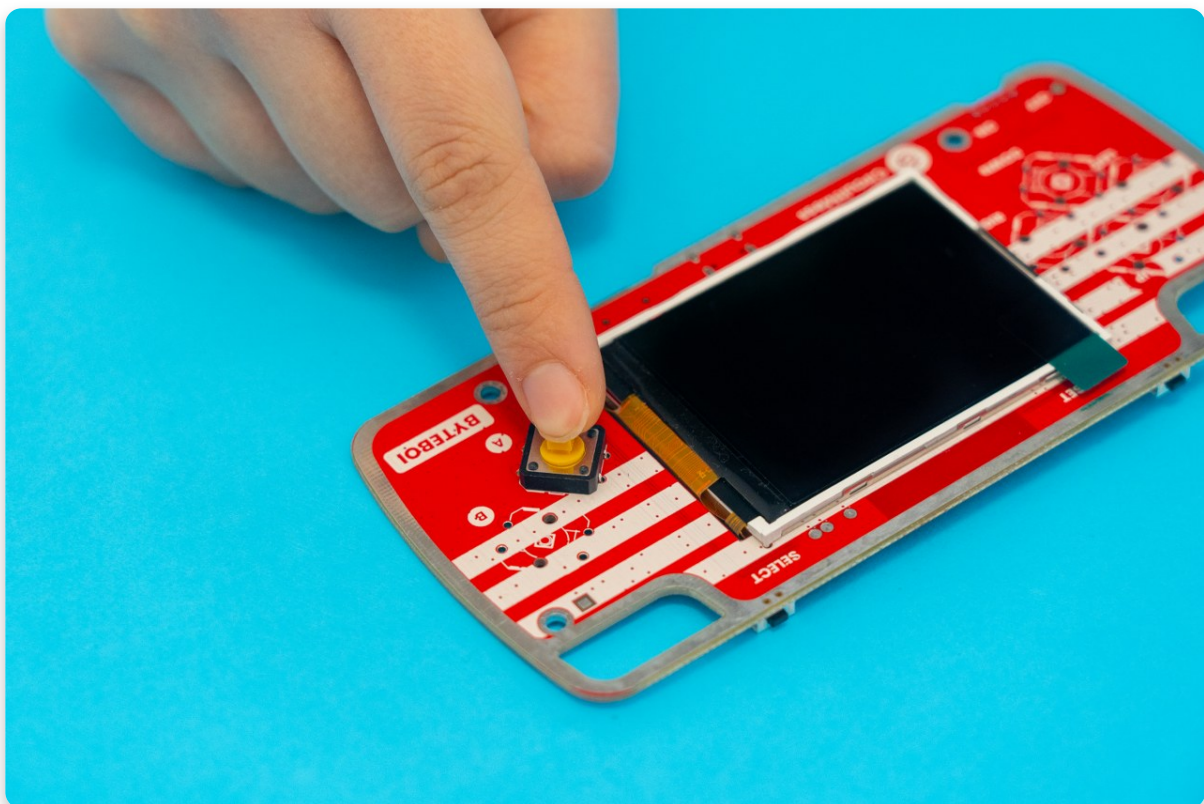
The main part of the console, besides the screen, is the buttons. You need to have some kind of input to move, shoot, dodge, and pause in the games.

Buttons are the most commonly used input, and there are a total of 6 of them (nine if you include the Selection, Reset, and On-off button).

The buttons consist of two parts - the mechanical button parts and the button caps. Buttons can work even without the caps, but pressing them with the caps on feels way nicer and they look a lot cooler.

Let's solder our first components!

Take the button and push it into the circuit board. Once it's in, it will make a clicking sound. Make sure that they all sit firmly on the board.





Before soldering the pushbuttons, make sure that they are perpendicular (vertical) to the board.

This is very important as you'll have trouble putting the protective casing on the device if the buttons are tilted.

After placing the components in the right place (pins through the tiny holes), put the main board on the surface in front of you and pick up the soldering iron.



This is how your circuit board should look after you've soldered all the pushbuttons on both sides. Check if you can click all of the buttons.



If all is well, move on to the next step. **If you're unsure about some solder joints, it's always better to fix them rather than leaving them at "might" work. You should always make sure everything is as good as it can be.**

The second and last part of soldering is to solder the on-off button.

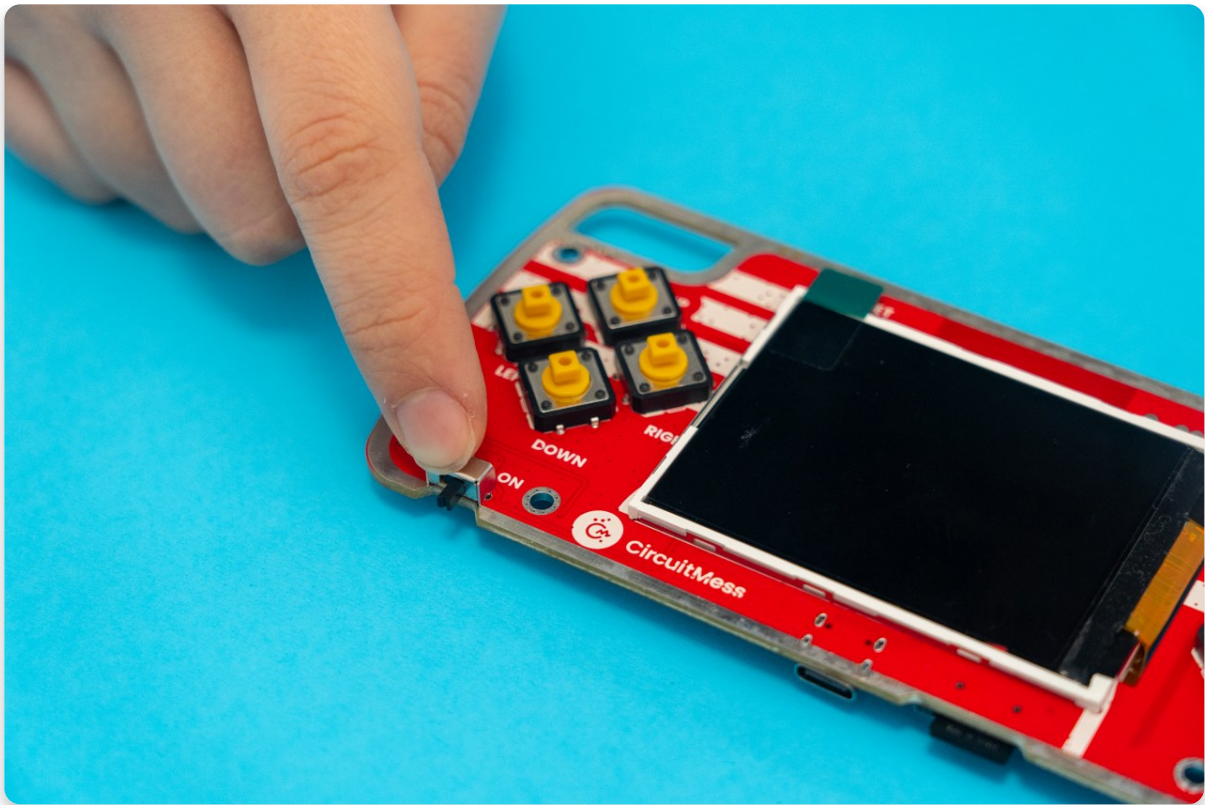
This is what you're going to need:



Before soldering this part, try to switch it around a few times. Each time the state of the switch changes, you should hear a loud click. So far, it's not doing anything, but soon enough, it will give life to your ByteBoi whenever you want it to.

Take the switch and put the pins through the holes so that the switch lies on the front part of the circuit board and the pins stick out of the back.

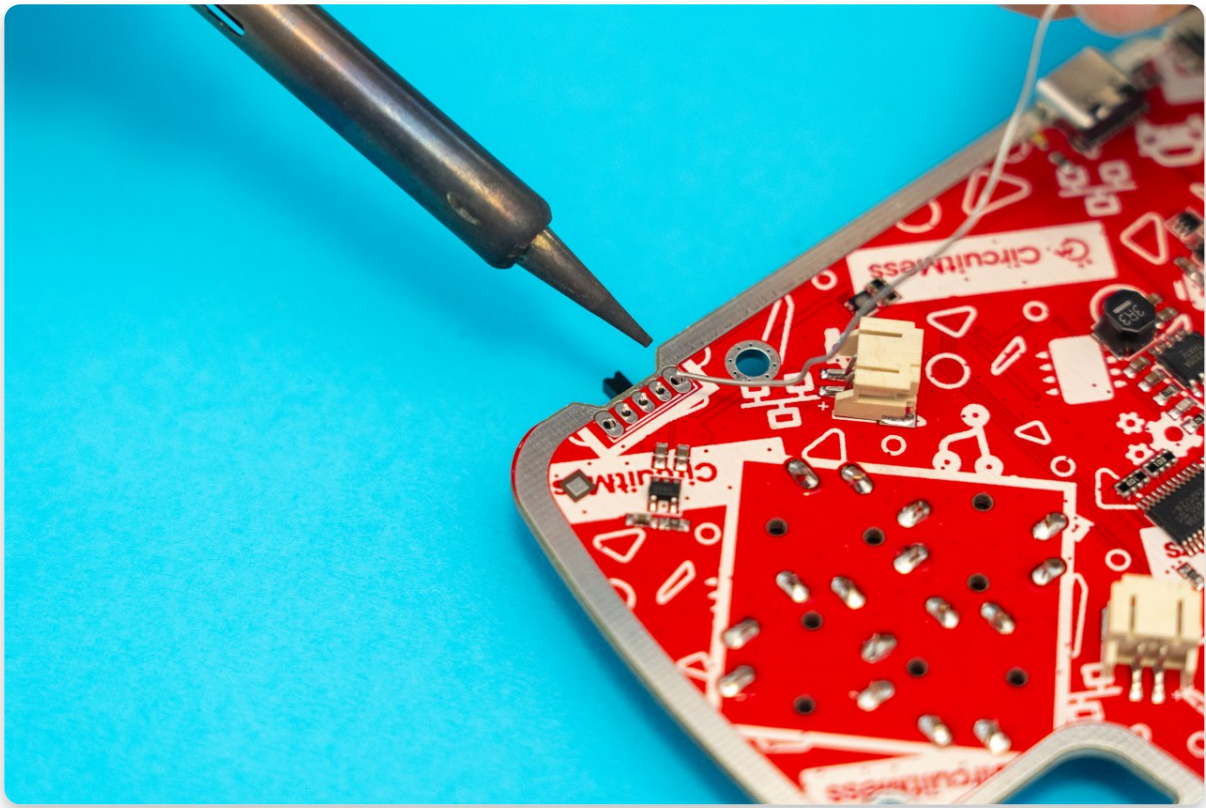
Try to wiggle the switch when pushing it inside since it may require a bit of force to fit in properly.



Is everything good? Great!

Turn your console around, take the soldering iron from the stand, clean it using a sponge, and begin to solder the pins in the place.

Soldering these pins requires a little bit more precision since they are so close together, so it's a lot easier to bridge them accidentally.



After soldering all of the pins, try the switch a few times. It should click when switched on-off.

Now is an excellent time to check all your soldering joints. Make sure there is no bridging and that every one of them looks alright.

It won't be easy to fix them after we put the case on.

Remember



We hope you had a great time soldering the components. Sadly, you'll have to turn off your soldering iron now, but there are fun steps ahead, and we're not quite done yet! Please turn off your soldering iron by unplugging it from the power outlet. Leave it on the soldering iron stand for at least five minutes, so it cools off before you put it away.

Ready to continue?

Putting the battery back on!

If everything looks good, you can put the battery back on.



Please put it in the same slot you previously pulled it out of. **Press it gently until you feel the click.**

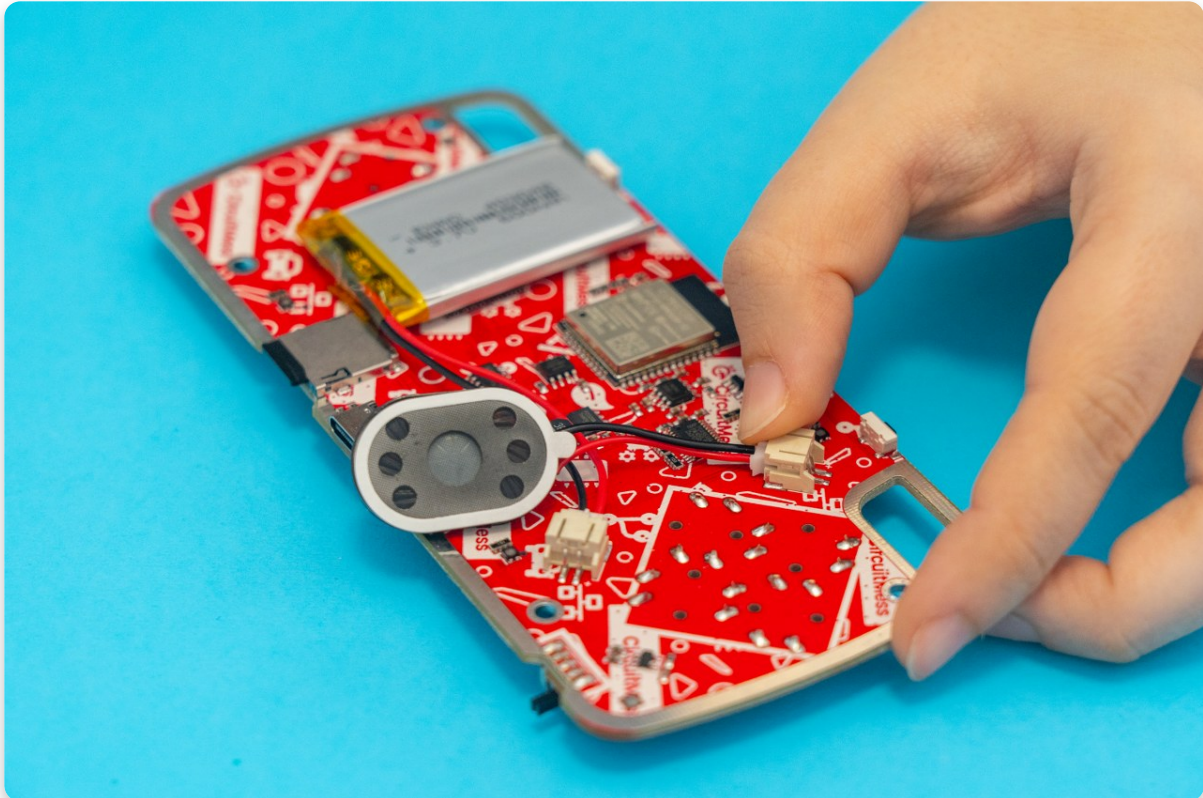


You can see that there are two identical slots on your circuit board. The other one is for the speaker, and we'll use it now.

Take the circuit board and the speaker.



Push it in the same way you did with the battery. So, gently until you feel the click.



You did the first part of assembling your ByteBoi. Great job!

In the next chapter, you will see how to do an input test to check if everything is working correctly.

Chapter two - Input test

Now that we soldered everything and put on the battery and the microphone, it's time to check if everything is working correctly.

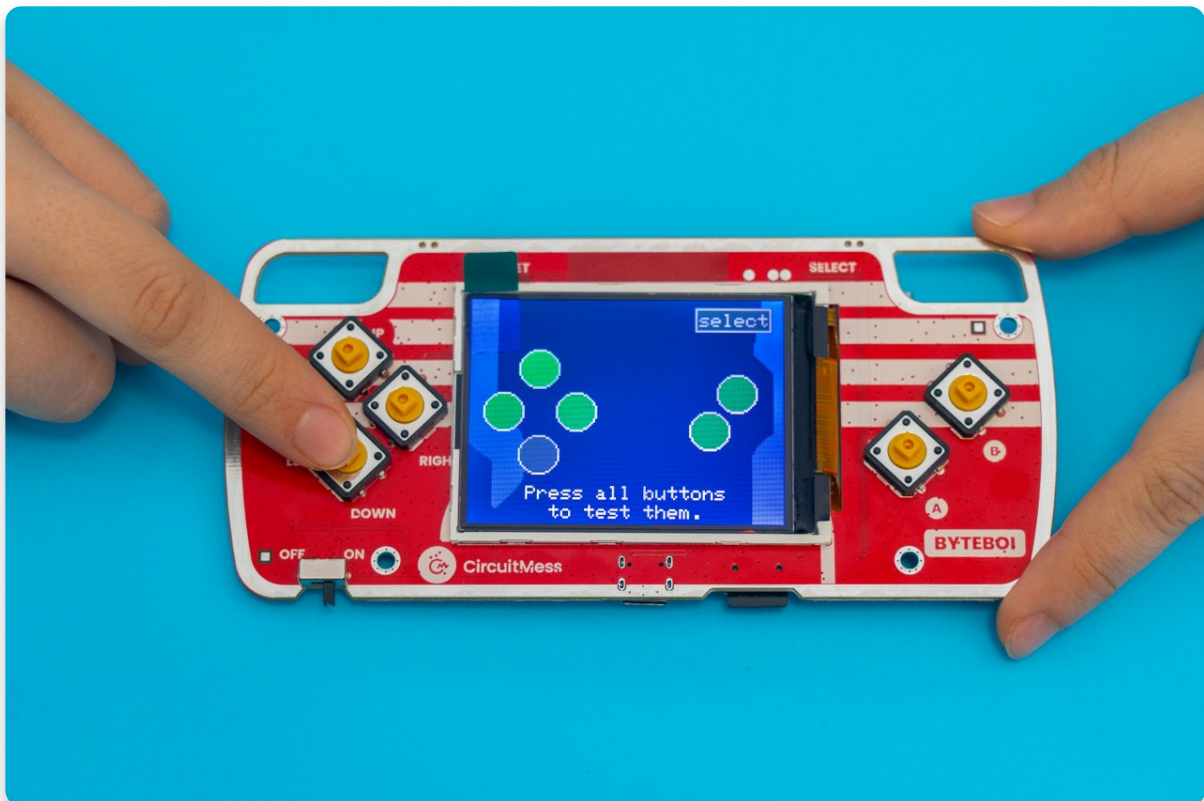
Turn on the ByteBoi!

You can turn on your ByteBoi, but just for a few minutes. It's not time for the games and coding yet.

You can turn it on by pushing an on-off button to the right, just like it says on the board. After your ByteBoi 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 pushbuttons. If a button is working correctly, the circle on your screen will turn green.

You can see how everything should look like in the following photos.





Make sure to press all the buttons to pass the test. That means you should press the Selection button (upper right) also.

The next one is the sound test. If you hear a melody coming from ByteBoi, you should press button A.

And the last test is the LEDs test. You should make sure all of the LED lights are working correctly.

If they are, you should see green, blue, and red lights blinking from the back.

If everything is lightening up properly, please press button A.

Now, you will see the list of all the games your ByteBoi will have pre-made.

After reading the names of all the games waiting for you, you can press A.

Voila, your ByteBoi is on!

This is how the menu should look like once it turns on:

That was an input test, an important step in assembling your CircuitMess devices.

Now that we checked that everything is okay, we will go back to casing up your ByteBoi.

Chapter Three - Casing up

Welcome to the next step, where you'll see how to assemble the casing for your ByteBoi!

As you probably already notices, you got seven acrylic casings in your box.

These are the ones you should have with you.



The first thing you need to do is to peel off the blue protective layers.

As you can see, each of the acrylic casing parts has a protective layer on both sides that needs to be peeled off. They are not yet fully transparent, but they should be once you finish this step!





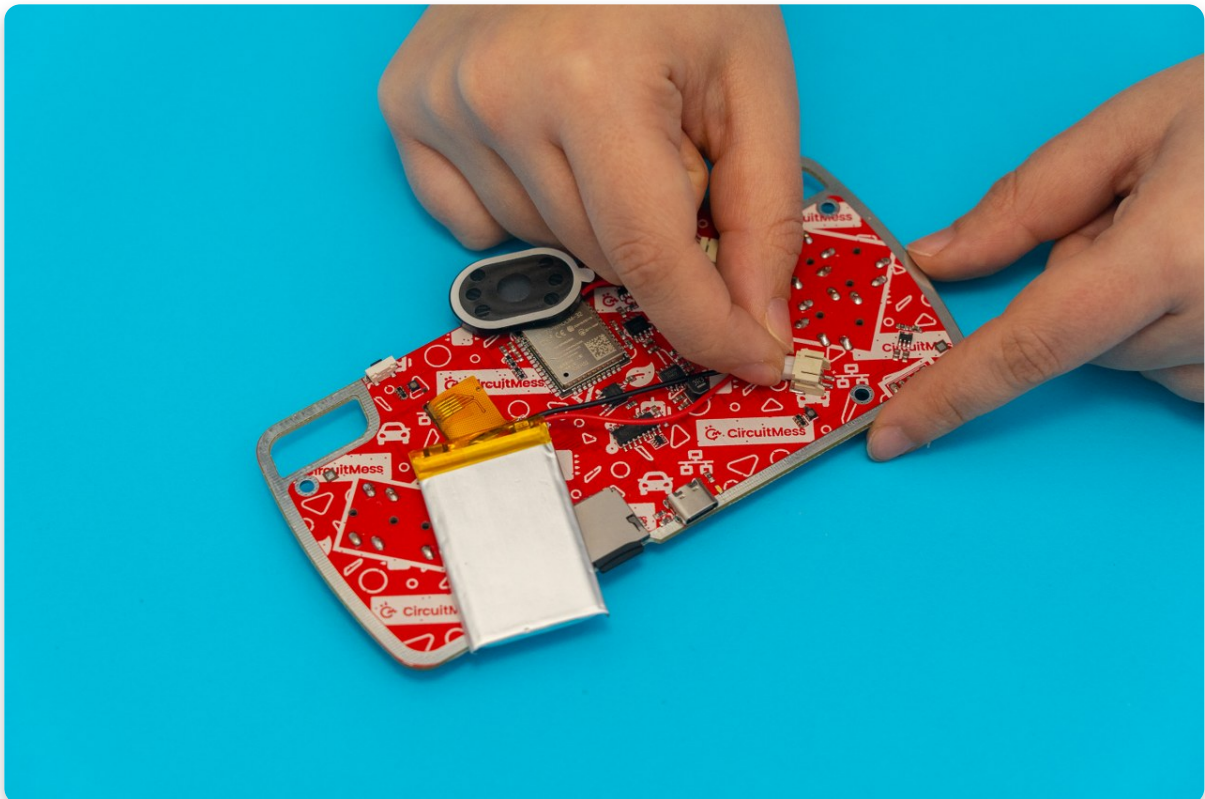
First, we're going to put four acrylic casings on the backside of your ByteBoi.

The acrylic panel that you need right now is easy to find - that's the one with all the holes in it.

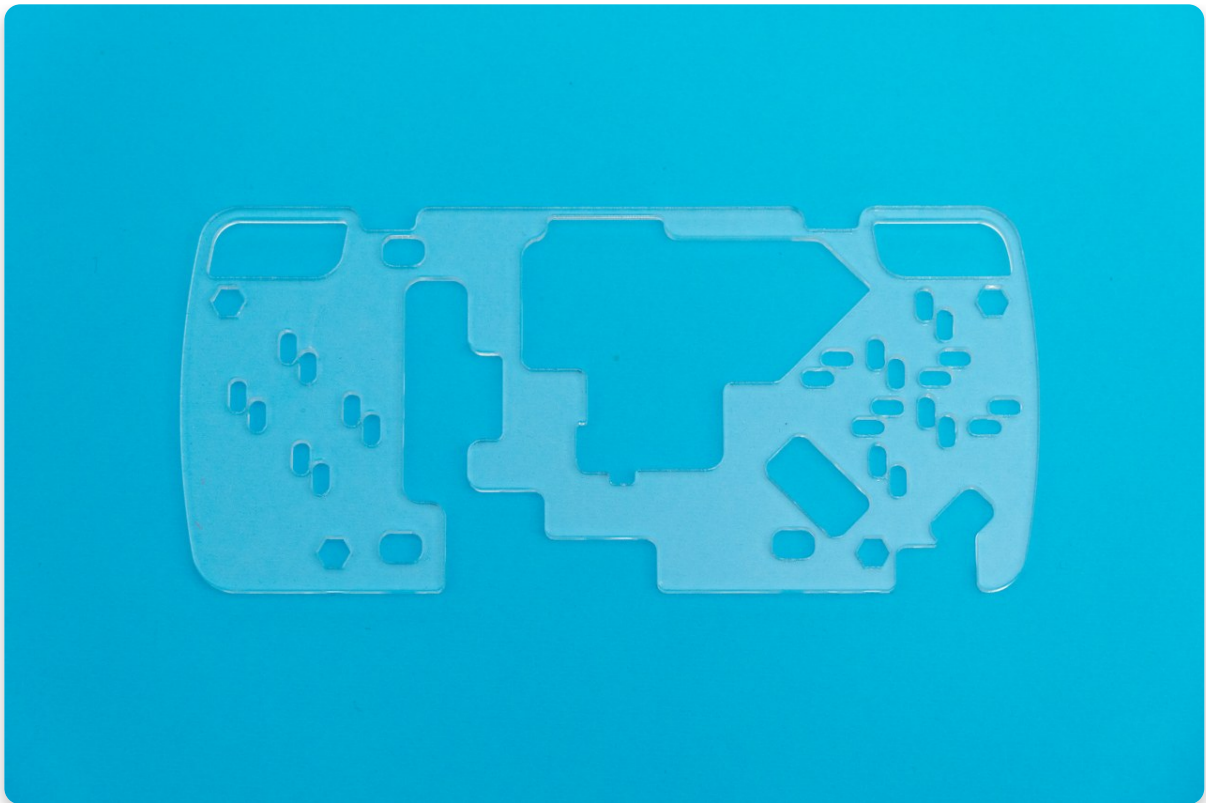
Please, take the casing shown in the photo below and the circuit board.



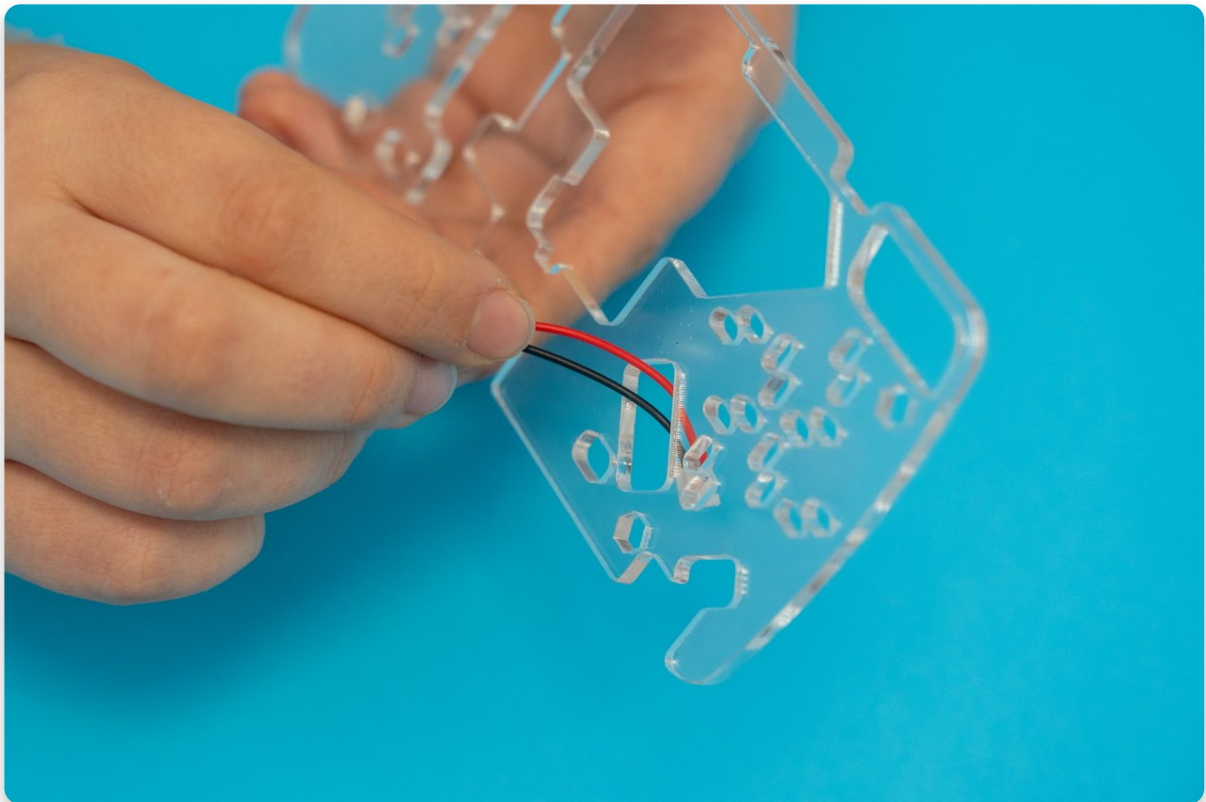
Once again, you'll need to pull out the battery from the slot. You need to do this to pull the battery wire through one of the holes.



Once you have pulled out the battery from the slot, take the acrylic casing and place it, so the arrow sign is facing to the right.

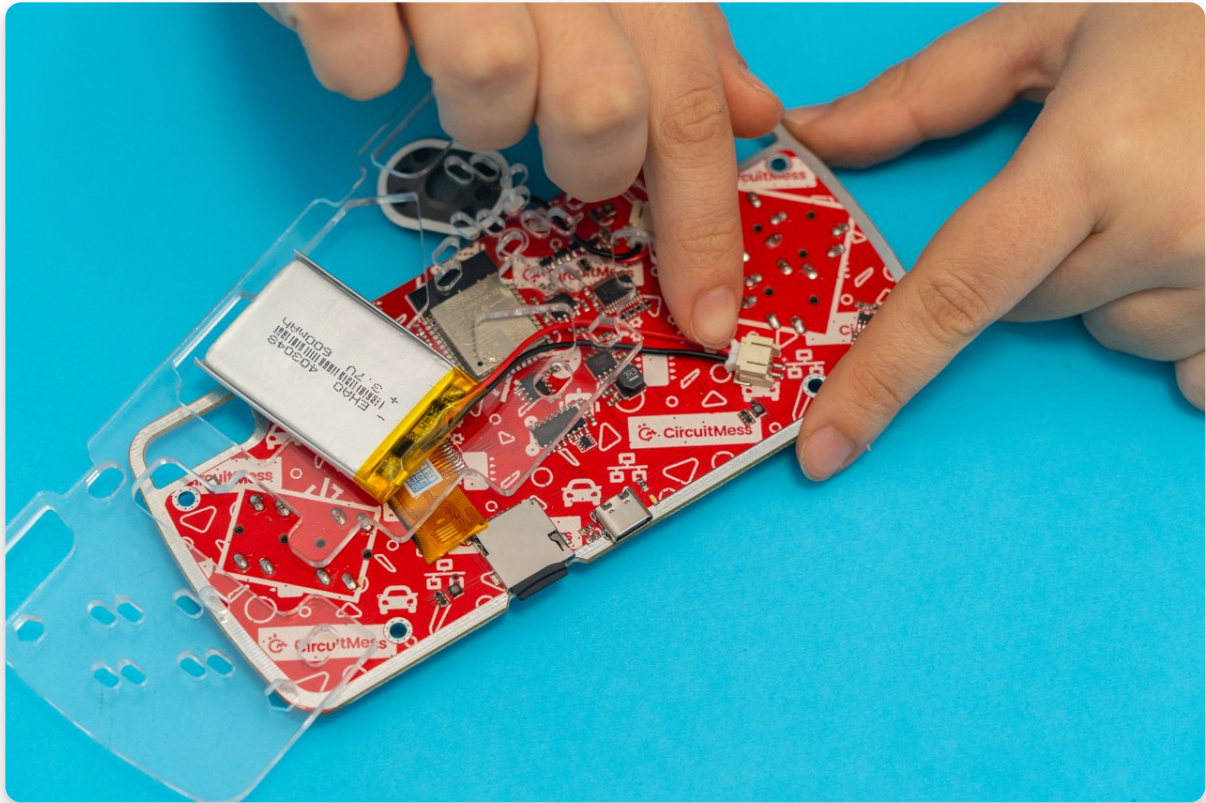


Now, pull the battery wires through the casing as shown in the photo below:

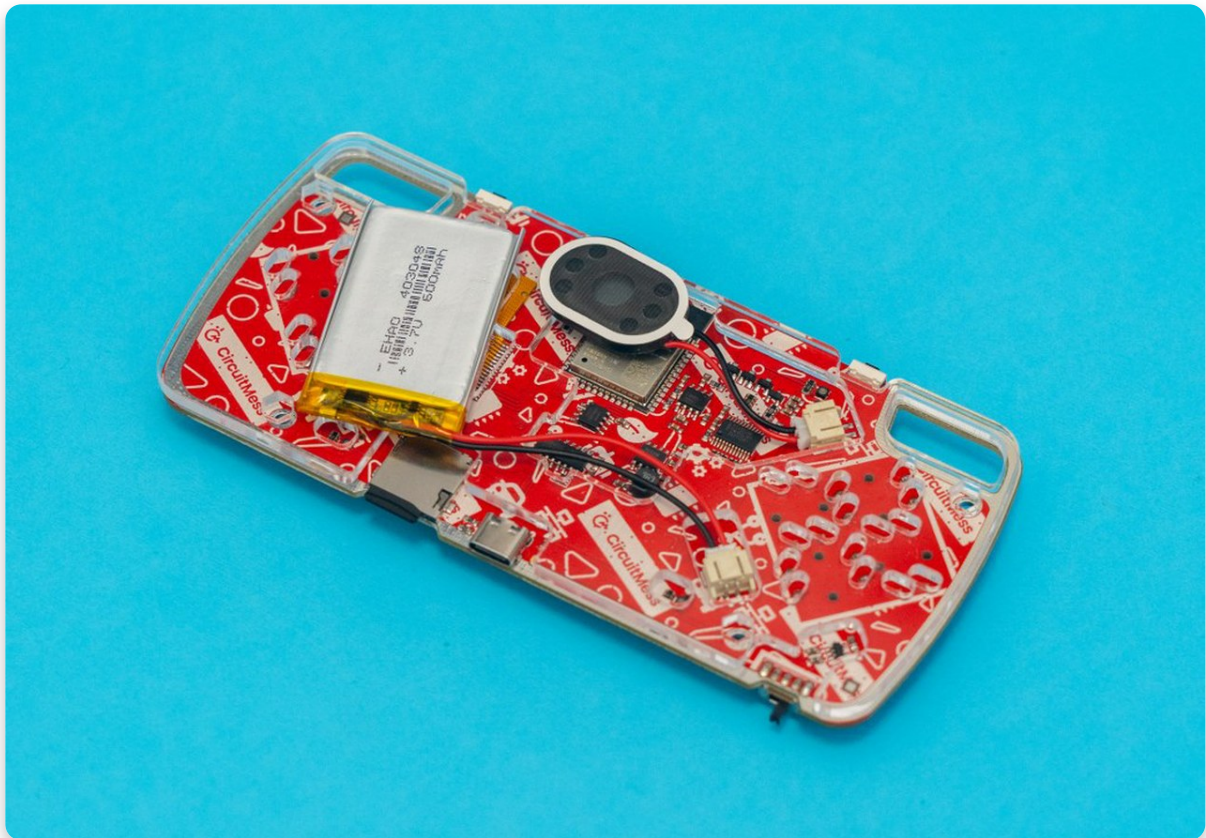


Remember: the arrow sign has to be facing right

After you pull the wires through the casing, you can put the battery back in the slot. As we mentioned before, the battery is connected once you feel the click.



Your ByteBoi should look like this by now:



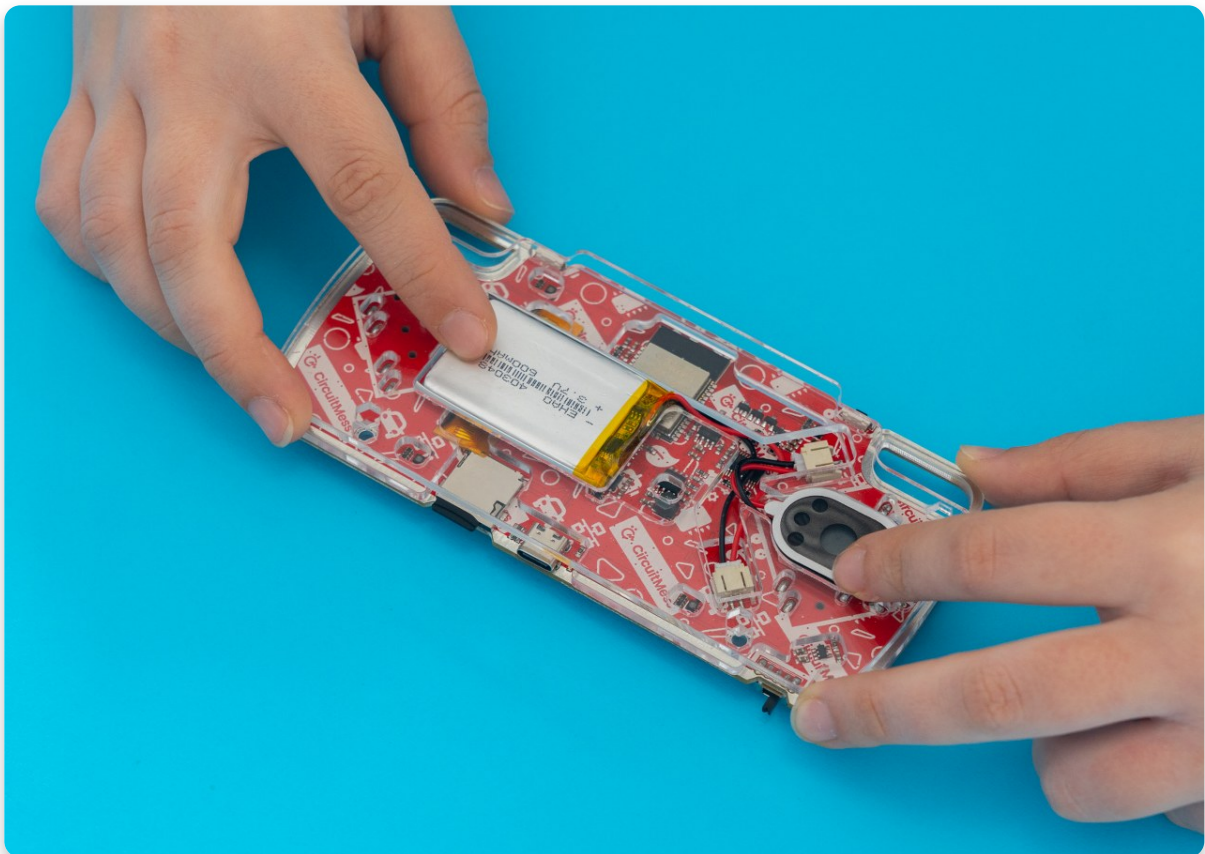
The photo below shows the acrylic casing you're going to need next. It's the one shaped like a little man.

Beware, the oval head-looking part is going on the right side of your ByteBoi.



You'll need to pull the battery through the square-shaped hole. The speaker will go through the oval-shaped hole.

For reference, look at the photo below:



Maybe you'll have some problems with the wires, but use a bit of strength to push them in the holes.

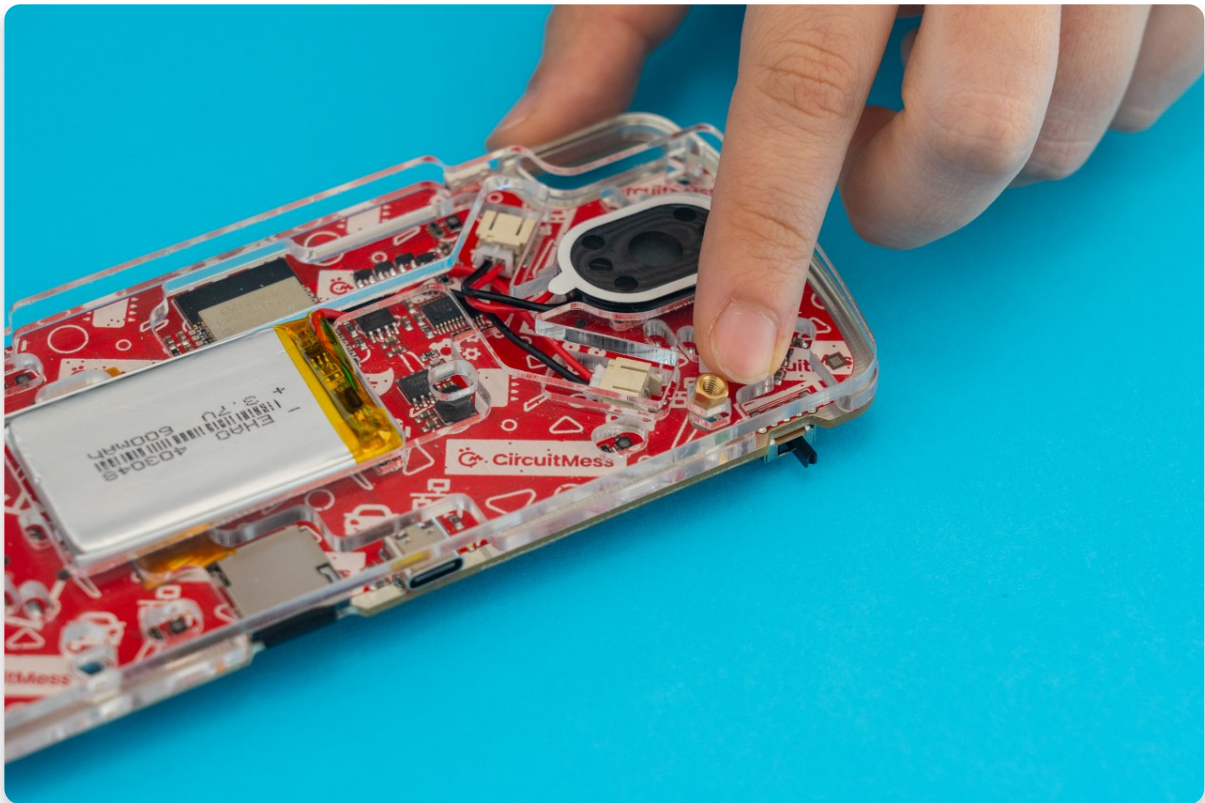
Everything has to fit perfectly into the acrylic casing.

Now, please take four golden spacers. You'll need to put them in the four small holes on the edges of the casing.



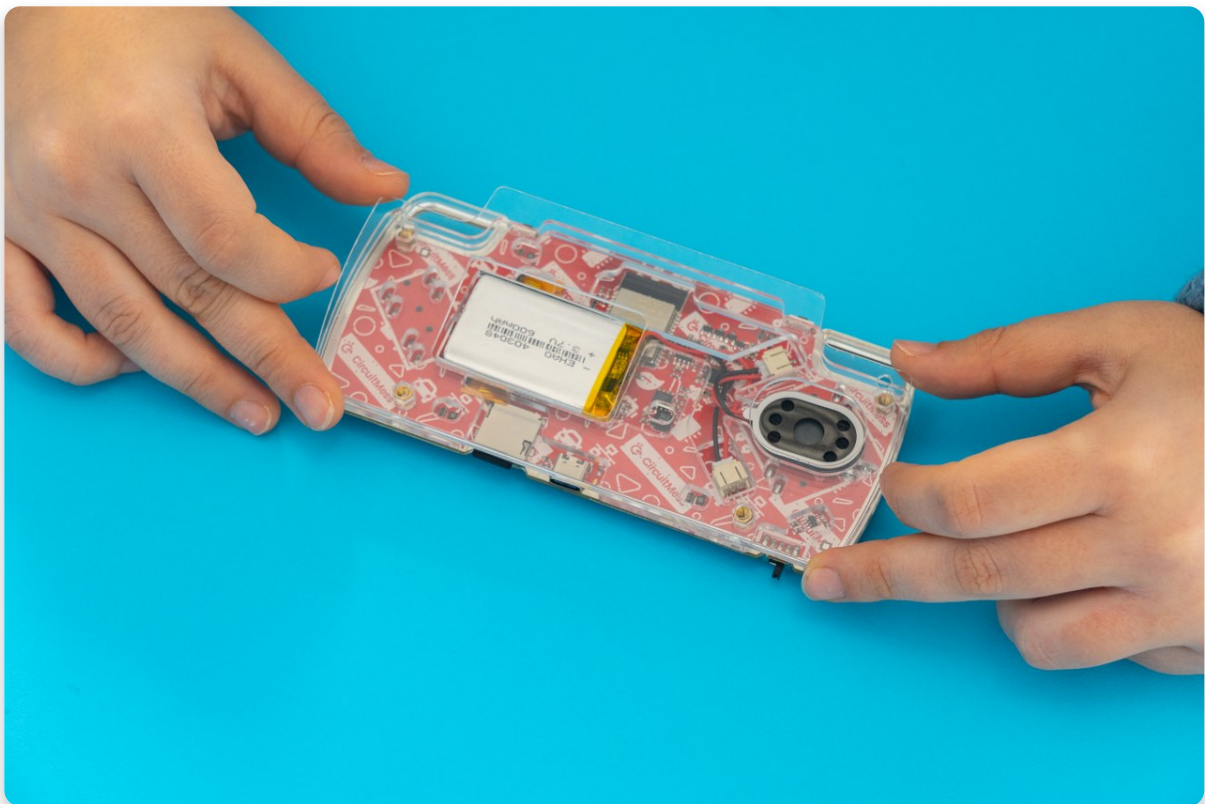
Golden spacers should fall through all the casings you've already put on your ByteBoi.

Your ByteBoi should look like this by now:

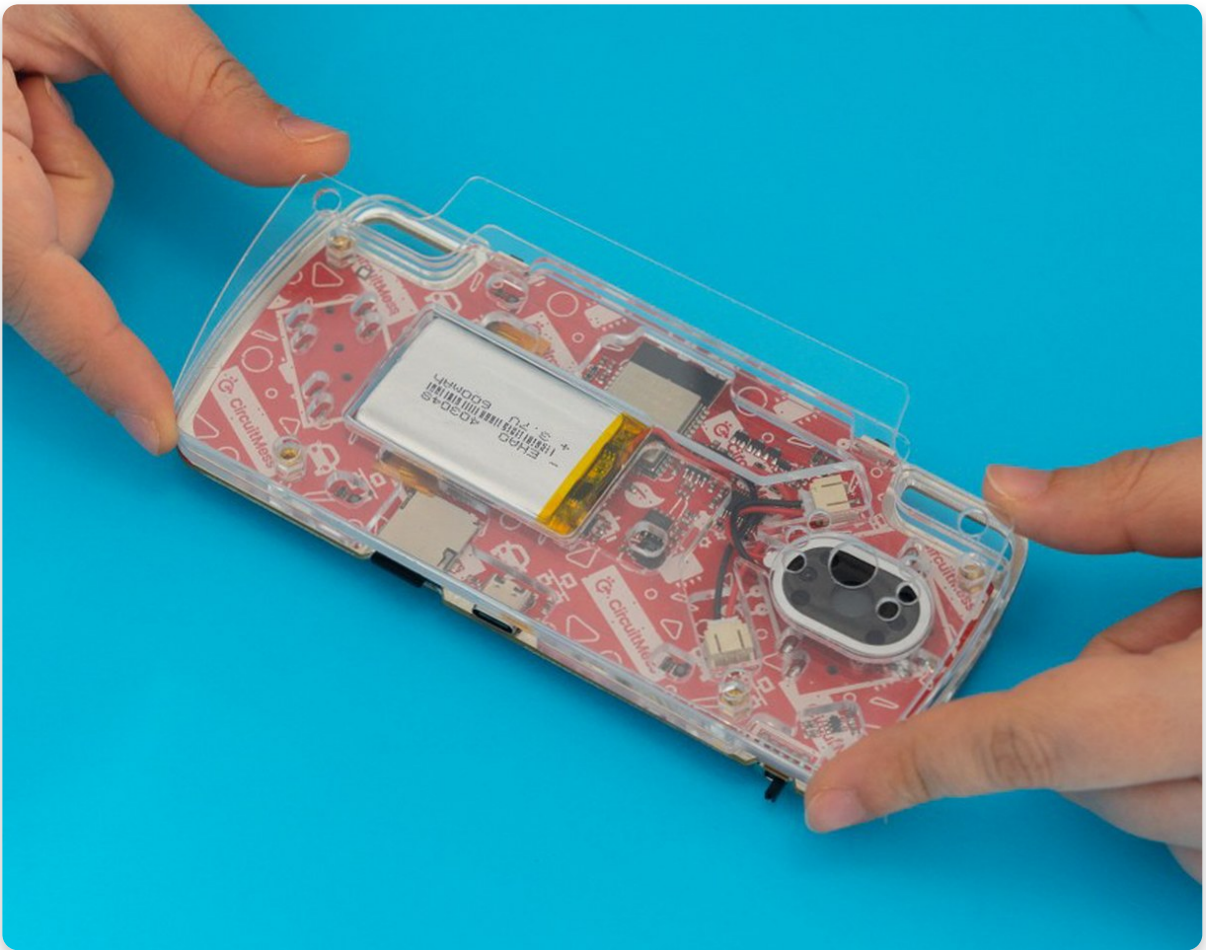
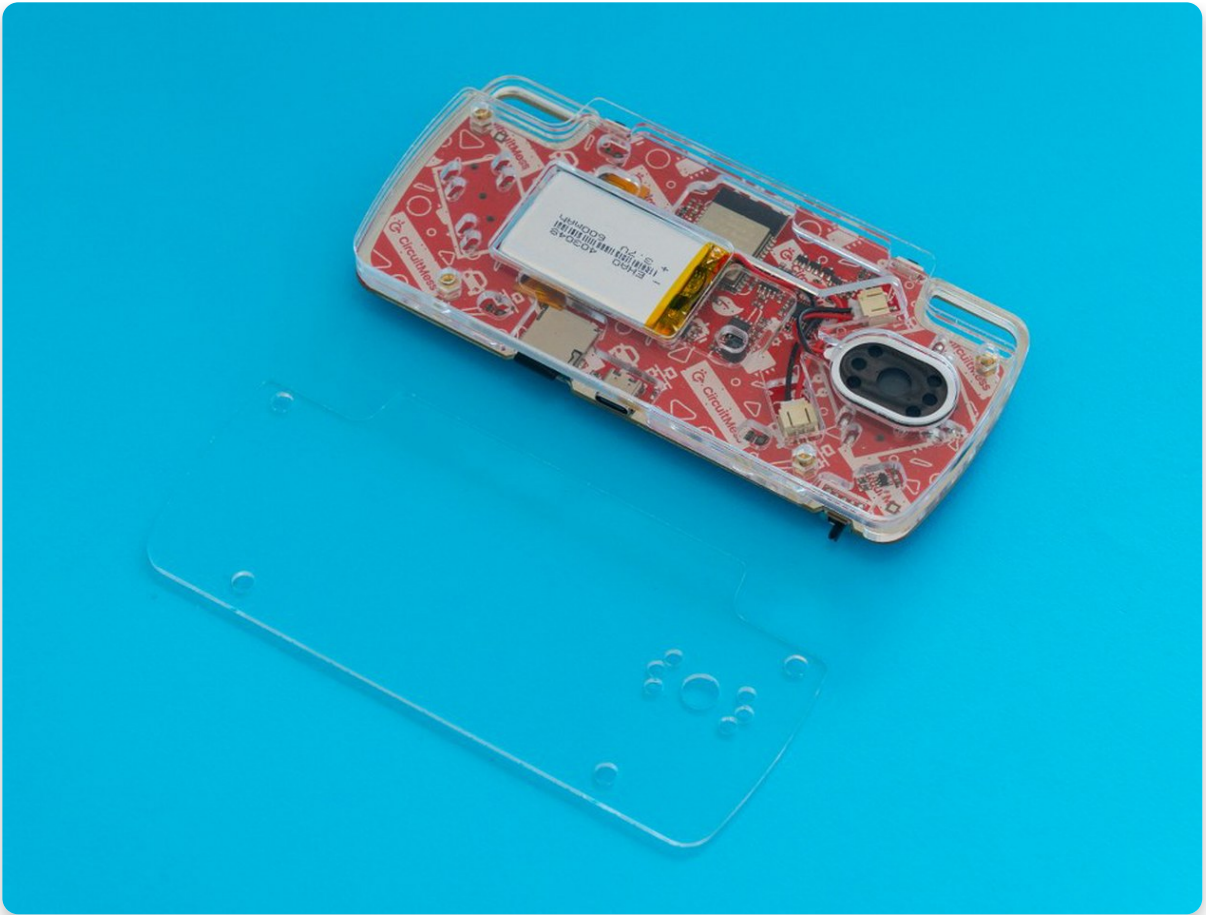


The next acrylic casing you're going to use is the one with the two holes; one square-shaped and one oval-shaped.

Please place it in order the oval-shaped hole is placed over the speaker, and the square-shaped one is placed over the battery.



Now, take the casing with a few small holes in it. The holes are placed over the speaker.



That was the final casing for the back of the ByteBoi.

Now, take four bolts (the smaller ones) and a screwdriver. You'll put the bolts in the same holes where you put golden spacers. Take your screwdriver and tighten the casing layer by screwing each small bolt.



Don't screw too hard because the casing might break

The first step should be done when you tighten all the small bolts – the back casing is all set!

Your ByteBoi should look like this by now:



Now, let's move to the front side of ByteBoi.

This is the perfect time to take off the protective layer from the screen.



Here you're going to need a casing shown in the photo below:



Place it as shown on the photo. Your buttons and screen should fit perfectly through the casing.



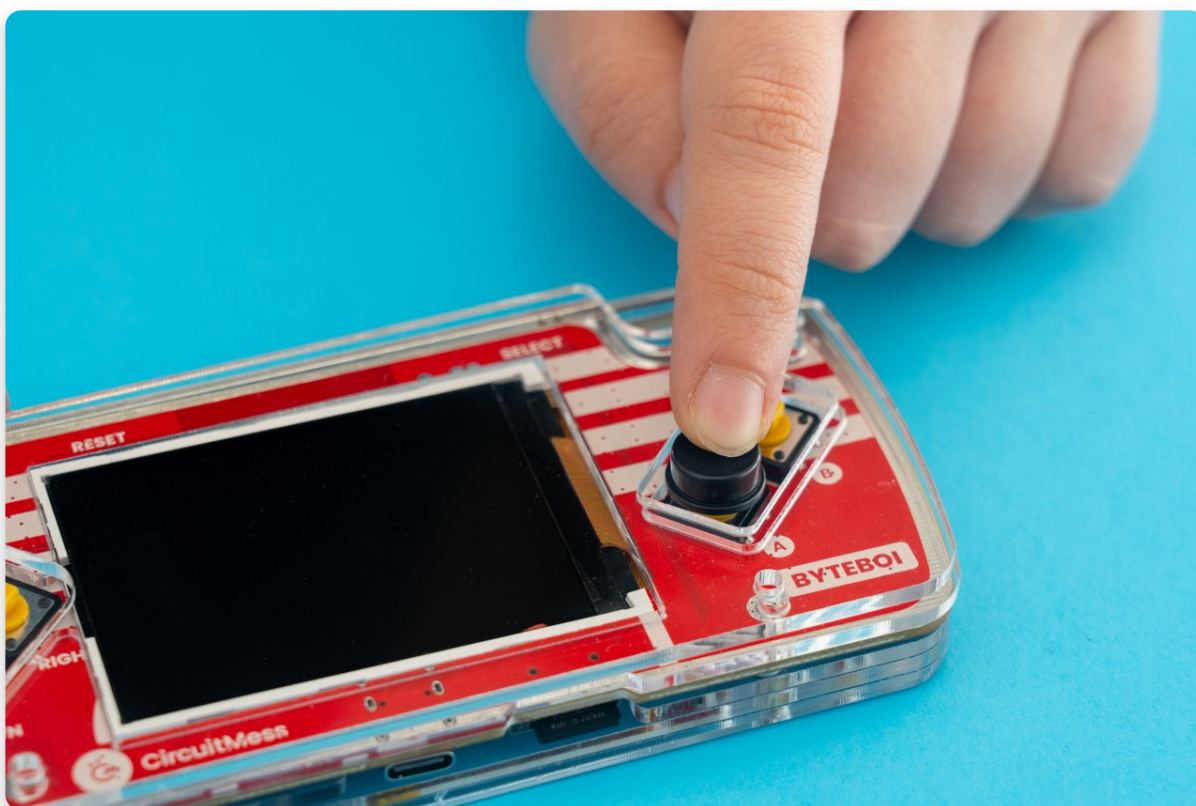
Now, take the one with the two square-shaped holes, and place it to fit the bigger hole on the left, where the four buttons are, and the smaller one on the right, where the two buttons are.



It's time to put button caps on your buttons!

Even though the console can work as-is, it would be much nicer to have a bit of a cleaner finish. The buttons are relatively small and aren't the most comfortable thing to hold. Therefore, we included some more comfortable button caps made out of plastic that will solve this issue.

Take whichever color you want from the ones you've got. We choose to take the black ones for our ByteBoi.

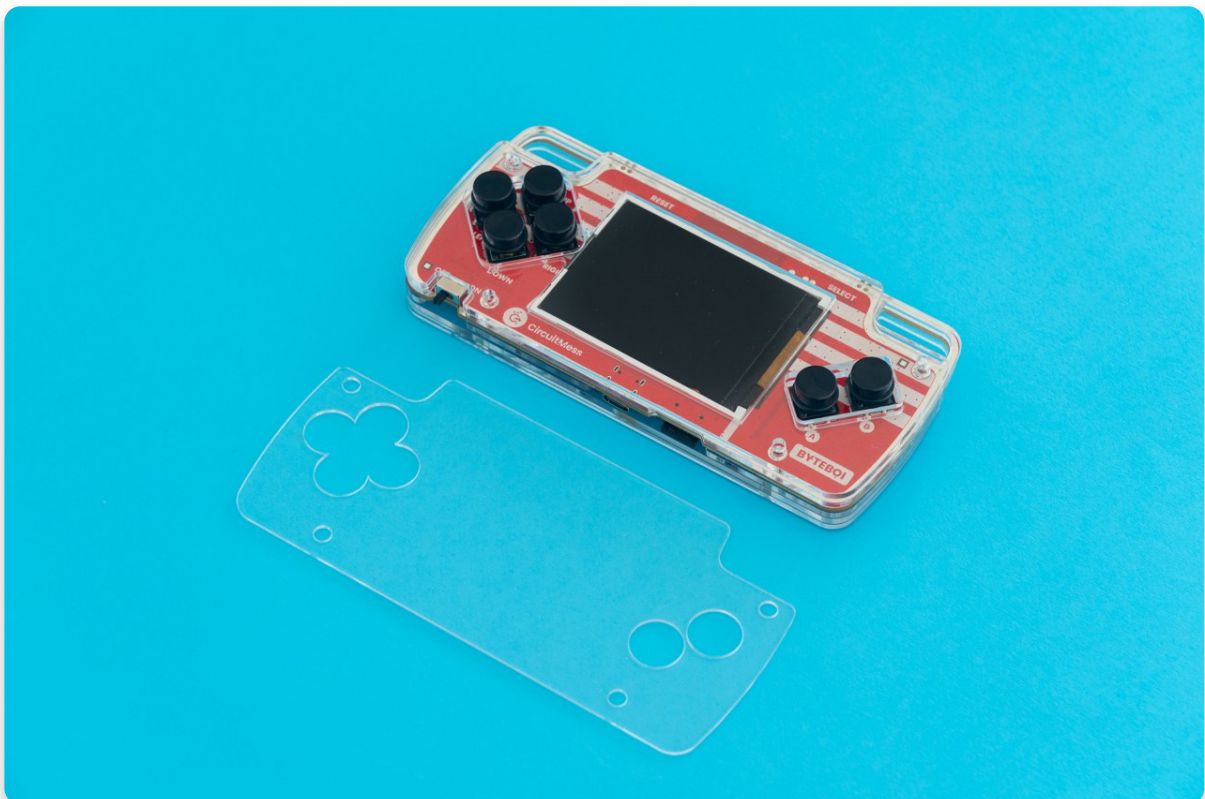


Push them in until they make a clicking sound.

This is how your ByteBoi should look once you put the button caps on:



Finally, it's time to add the last casing layer, and by tightening that one, you'll connect the front side of your ByteBoi.

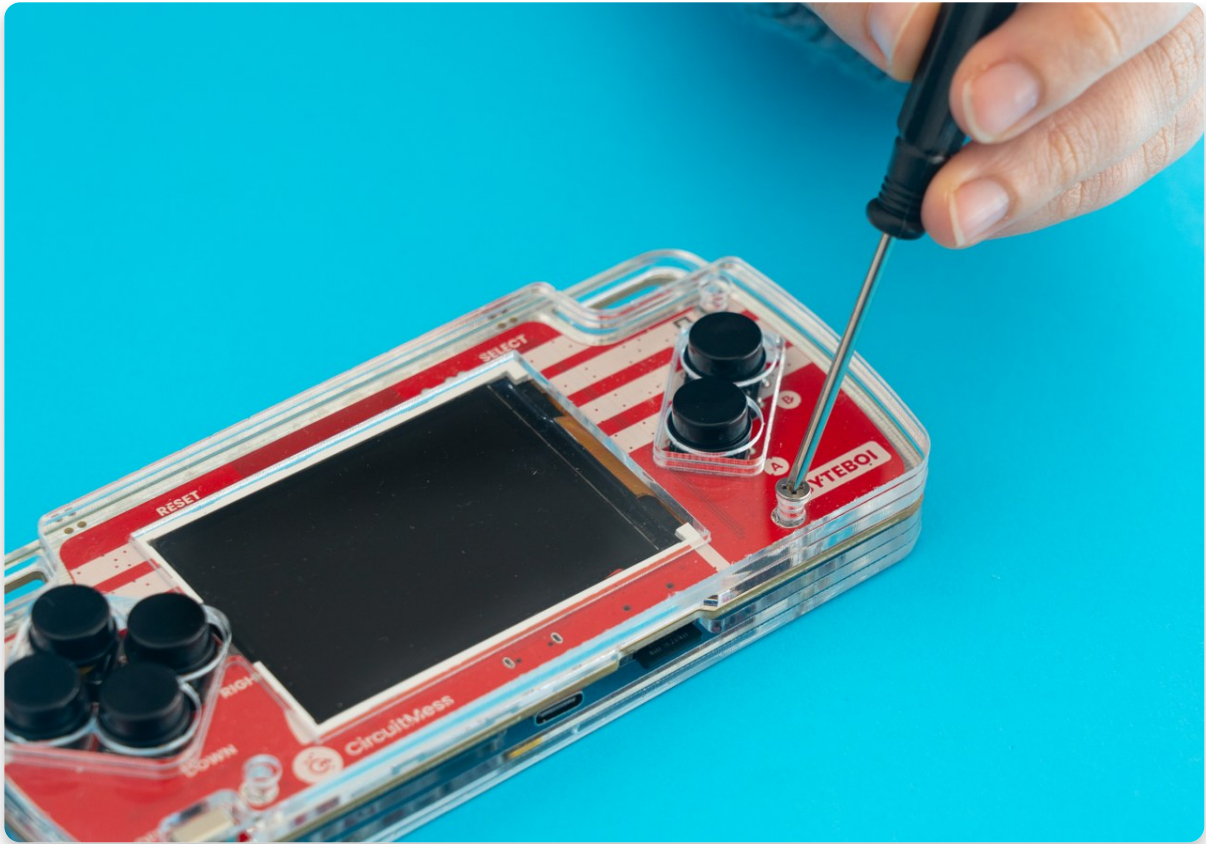




For the final step in your ByteBoi assembling adventure, take four bolts (the bigger ones) and the screwdriver.



Once again, put the bolts in the holes on the edges of ByteBoi, but make sure not to screw it too hard.



And voila, your ByteBoi is done!

Congratulations, you did a great job! We hope you had lots of fun assembling it.



Optional step

You may have noticed that you've got one strap. If you want, you can put it on your ByteBoi.

Here you can see how to do that.





What's next?

Let's play and code!

Congratulation! You have just built your own retro gaming console - ByteBoi!

We sincerely hope you liked the project so far because there's more coming.

Now you can learn how to use ByteBoi's features and make your video games.



Unfortunately, a coding guide is not available yet. We're working on it, and it will be available on our website at the beginning of December.

Until then, we hope you had fun assembling your ByteBoi, and that you'll have lots of fun playing games!

We appreciate your patience!