



NeuroDreamer Teardown

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<https://learn.adafruit.com/neurodreamer-teardown>

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Inside the NeuroDreamer

"Use your brainwaves to help you rest, guided by soothing music and fading lights." - [The NeuroDreamer Sleep Mask \(\)](#) by Cornfield Electronics is a meditation device that flashes colored lights at your eyelids and plays brainwave beats for your ears to help you fall asleep, have lucid dreams, or for meditation. NeuroDreamer is open source and CC-licensed and also designed by Adafruit friend Mitch Altman. We decided to open one up to see the details of its construction and figure out how it works.



The device is comprised of four main sections: The outer dry-cleanable mask surface layer that comes in contact with your face and has velcro straps, the protective zippered mesh bag inside, the molded foam piece, and the electronic circuit inside. The parts came apart easily with hardly any tools-- we only used a pair of scissors once (to free the button sheath from the circuit board inside). We were able to put it back together just as easily, with no wonkiness or signs of having opened it.

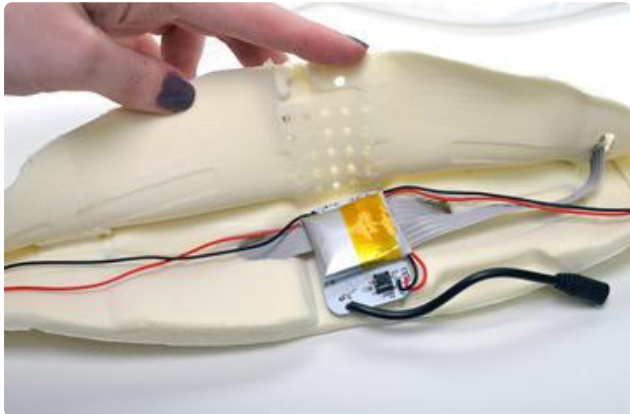
Used in this teardown:

- [USB Microscope - 5.0 Megapixel / 220x magnification / 8 LEDs \(http://adafru.it/636\)](http://adafru.it/636)
- [Articulated Arm Stand for USB Microscope \(http://adafru.it/969\)](http://adafru.it/969)



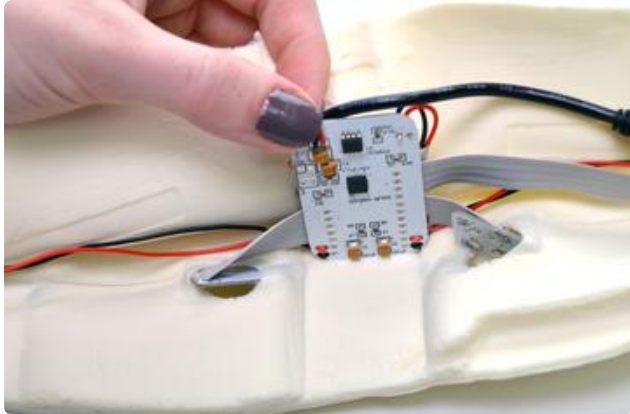
Sticking out of the molded foam piece is the button panel, which is just a PCB with three standard tactile switches inside a plastic and velcro sleeve.

The tactile switch board is connected connected to the main board by a flex connector.

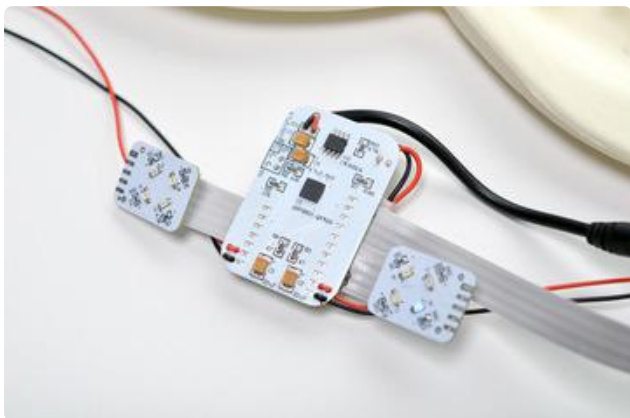


The rest of the circuit is housed inside the molded foam piece, with only the DC charging cable sticking out. The foam piece has holes in the front, perhaps for allowing air circulation around the battery.

The [NeuroDreamer is open source](#) (), so it can be fun to explore the schematic diagram while looking at the physical device. The main board has a Zilog [Z8F083A](#) () 8 bit microcontroller, similar to but less expensive than an Arduino chip, important for reducing cost of bill of materials for manufacturing many thousands of units.



There's a debug port for reprogramming, and various firmwares for the mask are available on the NeuroDreamer website! However you do need a ~\$30 specialized [Zilog programmer](#) () (but the [software](#) () is free).



At the bottom edge of the main board is the analog section for the speakers with capacitors and filter resistors for good quality audio.

Two LED boards are connected via flex connector, with 4 LEDs on each (red, yellow, green, and blue).

At the top edge of the main board is the battery charging circuit with a chip that controls charging so it doesn't overcharge or over-discharge the sensitive lithium polymer battery.