

Alpha Pup Technical Detail

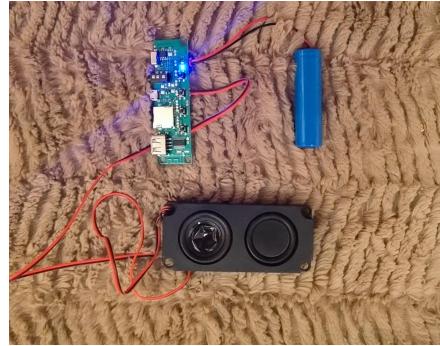
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Alpha pup is a wearable, a necklace-like medical device with two main parts the dog bone-shaped modified speaker and controller and an adjustable collar to be put around the dog's neck. The bone-shaped body contains the modified speaker we made from a programmable audio device, an amplified and tuned sound speaker, an Arduino nano as our microcontroller, and a Bluetooth device for connecting with users' phones.



The key to Alpha Pup lies with the innovative modified speaker, which specializes in producing sound waves of 5-12Hz, corresponding to the frequencies of the alpha brain wave in dogs. The Alpha brain waves are oscillating electrical voltages-waves inside the dogs' brains that correspond to feelings of joy and excitement. So, by mimicking a similar frequency using sound waves, which are of similar composition, Alpha pup can induce a weak alpha brain wave pulse in the brain of dogs, making them more excited and joyful, therefore, countering the symptoms of depression and helping the dogs to regain their happiness and lost spirit. This usage of sound waves to mimic brain waves has already been used on humans with the treatment of PTSD and has achieved promising results.



Specifically, I designed the exterior using 3d sharp and decided to use PLA, or Polylactic Acid, for its non-toxic, biodegradable, bite-resistant characteristics.



Then, for our audio controller, we designed our own PCB board using fritzing with an sd card slot to store our customized soundtracks, Bluetooth connection for connection with the user's phone, and 4 buttons for switching soundtracks, pausing and changing from sd card to Bluetooth mode. Lastly, I designed the soundtracks of Alpha Pup to be of a solfeggio style, 6-tone music scale using Audacity and an oscilloscope. I did extensive research and experimentation to find the optimal parameters that would produce the desired effect on the dogs' brain waves, without causing any harm or discomfort. I then used Audacity, a sound wave generator, and an oscilloscope to test different combinations of frequency and duration, and since I had no access to an EEG device, I observed and recorded the reactions of dogs and made changes accordingly.

Using sound waves to mimic brain waves reduces the cost to a great extent, allowing dogs' owners to buy it as its price is affordable. This treatment is a gradual process, and its effect might not be imminent or immediate. However, this gradual process mitigates much pain that dogs will suffer from normal medical treatment. Namely, Alpha Pup intends to solve the problem from the root cause. More than curing dogs' illnesses, Alpha Pup is also effective at preventing depression in dogs. Preventing dogs from getting depression benefits human society as well.