



<http://learn.parallax.com/contest/micromedic>

Project Id: **micro13DR257**  
**Transcendental Meditation Trainer**  
Project Report  
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Video at: <http://www.youtube.com/watch?v=vQzpQV6Zu7k>

Source code at:  
<https://github.com/antfriend/hypnoray>

Meditation could be a blockbuster drug except that it is free. The American Medical Association recommends transcendental-style meditation for lowering blood pressure (<http://hyper.ahajournals.org/content/61/6/1360.full>). Meditation is good for cardio health (<http://doctorsontm.org/american-medical-association>) and over 300 peer-reviewed published studies have found positive benefits for the treatment of PTSD, stress, and other conditions. Meditation has also been found to positively influence outcomes for mental tasks involving concentration and memory.

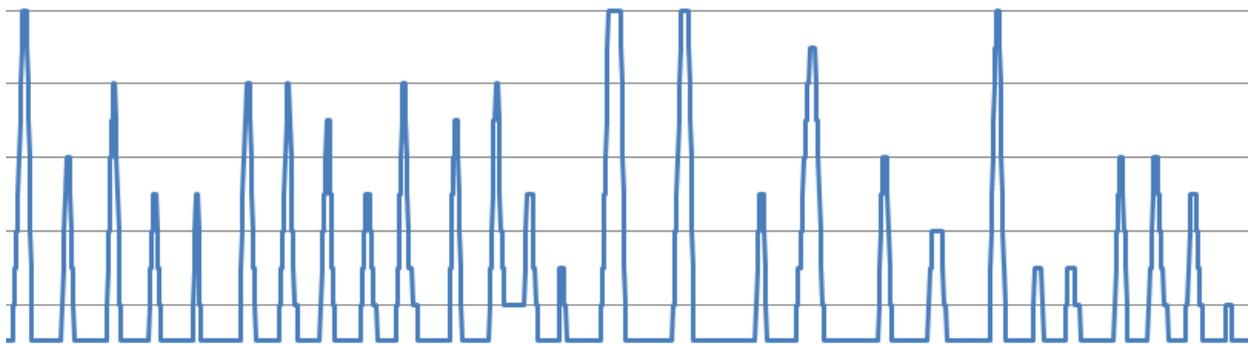
But like learning to swim, it can be difficult to learn from a book, or even a video. Official Transcendental Meditation™ training costs \$1500 at standard pricing. This device is something that could be produced at low cost to serve an extremely valuable medical need: training people in how to do transcendental-style meditation. Unlike brainwave entrainment devices, this device trains the user so that the device becomes unnecessary. Experienced meditators and naïve users have tried this device and reported that it helped them to achieve a meditative state.

This device uses a make-shift pneumograph constructed from the air bladder of a sphygmomanometer connected to a gas pressure sensor for precise, clean, and instant measurement of the user's breathing. The sensor is connected to a Propeller BOE programmed to auto-scale the pressure reading, and produce a simulated verbal chorus, chanting a mantra to the user's breathing. This audio response is delivered through the headphone jack of the BOE. The chant is in stereo, with a small amount of echo, with spacially separated voices in higher and lower harmonized tones with a vibrato effect at 5 hz to promote theta brainwave entrainment. These features are built from Chip Gracey's awesome vocal tract and stereo specializer modules.

The chant begins at the start of an exhale and continues until an inhale has begun. The depth and frequency of the breathing pattern are used to programmatically alter the verbalizations. While difficult to adequately describe or show, the effect is both hypnotic and instructive. Inducing a meditative state, but based in the user's own breathing. Through use, it becomes increasingly easy to achieve a meditative state with a pattern of breathing as the foundation, making the device unnecessary.

To my knowledge there is no other device like this one. Specifically, no other device uses breathing feedback as the basis for guided meditation. And no other device trains the user, by design, for independence from the device. "Focus on your breathing" is a central tenet of effective meditation and this device. Providing a cheap and effective way to train many people in meditation is the chief innovation.

Breathing that is logged to the micro SD card and charted, looks like this:



#### INSTRUCTIONS FOR USE:

Strap the device at a comfortable position on your belly. It is better to be around the top of the belly than below the bellybutton. Inflate the air bladder (if needed) to be full but still squishy.

Turn it on. Take a deep breath. You should see the bar graph rise fully to the top of your inhale and decline fully at the bottom of your exhale. If the device is correctly adjusted, your breathing should not be restricted. Adjust as needed. The device can be quite loose, with a very softly inflated air bladder.

It will function equally well if it is uncomfortably tight, with a firm air bladder. The important thing is to make it comfortable and unrestrictive.

This device will not force a meditative state, it will help you to learn to develop a meditative state.

Our bodies already know how to meditate. Just as we can go to sleep each night and wake up each morning, we can meditate daily. What must be learned, is how to tell our bodies that right

now, at this time, we want to go into a meditative state. Once you've done it, subsequent attempts succeed with increasing ease.

MORE:

If you have not already learned to meditate, this device will teach you, upon repeated usage, how to meditate on your own without the device. This goal is accomplished through the way the device models chanting a mantra to your own breathing.

The device may also serve to assist in achieving a mentally and physically beneficial meditative state under even less conducive environmental or situational contexts.

Learning to effectively meditate is like learning to swim; it is difficult to do from reading about it. It is best done through training, but training is expensive and requires a lot of one-on-one time.

Using real-time biofeedback on your breathing, this device trains you to meditate for the many physical and emotional health benefits that come with daily meditation.

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