

A Deconstruction of The ZenDen.



By Rimini Muschamp

INTRODUCTION

This essay analyzes my approach to developing ZenDen's concept and construction. Which is a frequency & harmonic distributor that amplifies the healing solfeggio scale. Using tuning forks the healing resonance engulfs & soothes the listener.

The ZenDen can either have a single tone or multiple tuning fork frequencies to create a binaural effect. This is so that not only do you rebalance your body you are also stimulating meditation at the same time.

This paper discusses the issues faced, and the principles followed by a brief market analysis. It also discusses potential improvements to future models and the outcome of the work.

My Approach

I have been intrigued by the concept of producing popular music that not only makes you dance but also has healing properties for some time now. So when tasked with creating an instrument, I decided to experiment with tuning forks and solfeggio frequencies as the primary sound source to explore ways to combine the two with modern technology for a more immersive and potentially deeper healing experience. As these findings will also inform my final project of term 3.

After attending a number of traditional sound healing baths, a form of sound therapy that uses a range of instruments usually held in a hall with a large number of participants, I experienced some intense and profound healing. However, the common drawback of being in a large hall with many participants is that the sound can sometimes be far away and difficult to hear. This makes it less effective as you are often left waiting for the facilitator to come to your part of the room and play the instrument.

This led me to think about ways to address this issue, exploring ways to bring sound healing to participants in a more immersive and effective way.

Doing some research in this field I discovered a modality called Biofield Tuning. This uses vibrational sound from tuning forks on and around the body. Biofield tuning is a method of removing dissonance in the body's electromagnetic field. This is done to create increased resonance within each chakra & organ and also within the meridians and acupuncture points in the body. Which have a profound impact on both the physical body, the mind and the emotional body.

I also attended a couple of Dolby Atmos events that discussed their technology's ability to create binaural beats for meditation and greater emotional well-being. This is done by activating the right and left brain parts.

This gave me the idea of creating some kind of surround sound that would have a similar effect on the body and mind. Maintaining the simplicity and essence of tuning fork healing.

I had to explore the most soothing frequencies to focus on, how to amplify without losing tone purity, if and how to create a binaural effect, and how best to place the speakers to create the most healing harmonic vibrations.

An Overview and Background Of ZenDen

ZenDen has been born out of a culmination of research and personal interests in the power of sound and resonance. Spanning from my own experience with tuning forks and some amazing sound healing experiences. I naturally started diving deep into the history of these tools. ZenDen seeks to bring them together in a modern way.

ZenDen focuses on tuning forks and Solfeggio healing tones. These tools have gained popularity worldwide as tools used for self-healing and general wellness. These tools are

believed to promote relaxation, reduce stress levels, improve mental clarity and even heal physical ailments. Which has been backed up by a lot of scientific research.

Tuning forks in medicine date back to the early 19th century when physicians used them to diagnose hearing impairments. Later on, tuning forks were introduced into physical therapy as tools for rehabilitating and strengthening the body's muscles. In recent years, tuning forks have become increasingly popular among holistic practitioners who use them as a form of sound therapy to promote healing and relaxation in patients.

The science behind the use of tuning forks in sound therapy lies in the fact that sound frequencies have a direct impact on the body's energy vibrations. When struck, each tuning fork produces a specific frequency that corresponds to a specific part of the body, chakra, or energy centre. The vibrations produced by the tuning forks aid in restoring balance and harmony to these energy centres, which facilitates healing and relaxation.

Solfeggio healing tones, on the other hand, refer to a specific set of frequencies believed to have healing properties. These frequencies were discovered by Dr Joseph Puleo, a naturopathic physician and herbalist, who claimed that they had been used by ancient monks in medieval times to promote spiritual and physical healing. The Solfeggio frequencies consist of six tones, namely 396 Hz, 417 Hz, 528 Hz, 639 Hz, 741 Hz, and 852 Hz, each believed to have specific healing properties.

The use of Solfeggio healing tones in modern-day wellness practices involves playing them through sound therapy instruments such as tuning forks, singing bowls, or speakers. Practitioners believe that when these frequencies are played, they have the ability to activate dormant areas of the brain, stimulate the release of hormones that promote healing, and even repair damaged DNA.

This has been demonstrated in a number of studies including one carried out by Juntendo University in Tokyo in which they studied the 'Effect of 528 Hz Music on the Endocrine System and Autonomic Nervous System'. Which revealed 'the stress-reducing effect on the endocrine system and the autonomic nervous system of music with a frequency of 528 Hz, which has recently attracted attention as a "healing" type of music. The Profile of Mood State, 2nd edition, was also administered as a subjective indicator of stress. In the 528 Hz condition, mean levels of cortisol significantly decreased, chromogranin A tended to

decrease, and oxytocin significantly increased after music exposure. However, no significant change was observed in any salivary biomarkers in the 440 Hz condition.’

Akimoto, K. *et al.* (2018) “Effect of 528 Hz Music on the Endocrine System and Autonomic Nervous System,” *Health*, 10(09), pp. 1159–1170. Available at: <https://doi.org/10.4236/health.2018.109088>.

Another approach to sound healing takes place in the "biofield," which is also known as the aura, which refers to the energy and information field surrounding the human body. In 1994, scientists from the National Institute of Health coined the term biofield. This energy field extends approximately 5 to 6 feet in all directions from the body. Emotional fluctuations cause the tuning fork tone to change, which could be high, harsh, sharp, dull, or low. The tuning fork usually vibrates for quite some time but stops quickly when balancing dissonance. A clear tone indicates that the tuning fork's sound balanced emotional turbulence/energetic blockage.

‘Eileen McKusick is the founder and developer of Biofield Tuning. Her research has shown that the Biofield holds energy from different emotional experiences. The encoded information within each of us also appears to have a timeline, like the rings of a tree.’

Biofield Tuning | Biofield Being (2023). Available at:

<https://biofieldbeing.com.au/biofield-tuning/>.

Another area of research based on a more modern approach to wellness is the use of binaural beats. Also explained as brainwave entrainment, you can induce relaxation, focus, or even sleep by stimulating your brain. To do this, a tone is played into each ear at a frequency that corresponds to a specific brain wave.

Binaural beats are an auditory phenomenon that occurs when two different frequencies are played into each ear. The brain then perceives a third frequency which is the difference between the two tones. This can induce a certain brainwave frequency, depending on the desired outcome. Binaural beats have various benefits, including reducing anxiety and stress, improving focus and concentration, and aiding in sleep and relaxation. Despite the rise in popularity, more research is needed to fully understand the potential benefits and limitations of binaural beats.

Another advancement in music and how it is consumed is Dolby Atmos surround sound technology. That allows for a more immersive audio experience in movies, television shows, and video games. Unlike traditional surround sound which uses channels, Dolby Atmos adds sound objects that move independently in a three-dimensional space, providing a more realistic and dynamic audio environment. This technology allows sound to be placed and moved precisely around the listener, creating a more immersive and lifelike experience. Dolby Atmos benefits include enhanced realism, improved spatial awareness, and a more engaging overall experience.

So why am I diving into such detail about all of these topics? Well, the ZenDen prototype is an attempt to integrate the advancements in sound healing and sound design technology to deliver a sustainable and flexible approach to audio therapy. Which can replace the need for a sound healing therapist and can be delivered in the comfort of your own home. Or on a large scale like a hospital, office or within a club or festival setting.

The ZenDen Sound Therapy System can be paired with smaller amps or plugged into a large-scale sound system like a Dolby Atmos speaker set. Reaching a wider audience in innovative ways and breaking down the entry barrier into sound therapy.

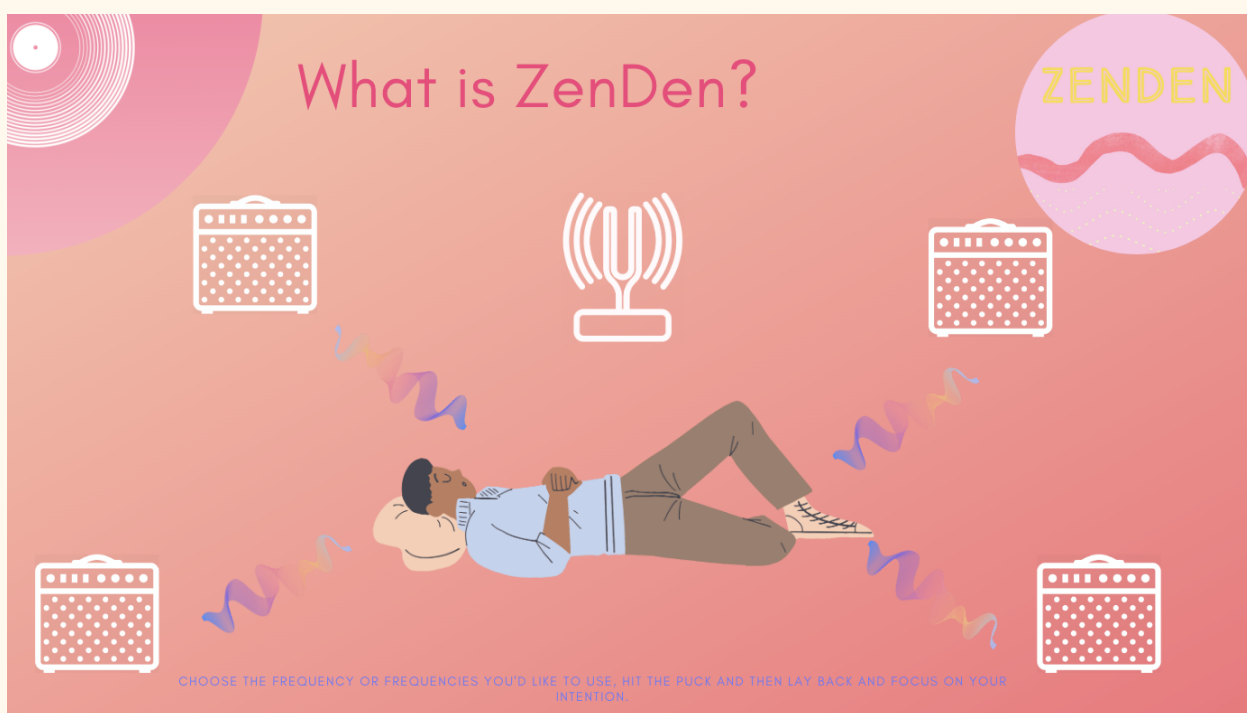
There are many producers and musicians interested in sound healing. Developing a system that can be used by anyone, allows more people to have access and share the benefits.

How do you use ZenDen?

ZenDen has been created to be easy to use and doesn't require technical knowledge.

- Set an intention for your session.
 - This can be health-related or emotional
- Choose the frequency or frequency range you'd like to work with. Using the frequency range chart. (see below)

- Make sure you have a clear and quiet space to lie down and relax.
- Place your amps or speakers around the space you will lie down in.
- Then using the hockey puck supplied with the ZenDen system, strike the tuning forks and place them on the tuning fork stand.
- Lay down and enjoy, paying attention to your breath and intention.



ZenDen incorporates & borrows from all of these areas of research to provide a modern-day sound bath so that you can enjoy a relaxing, meditative experience while listening to healing solfeggio tones.

The insert that will come with the instrument provides a breakdown of the different frequencies and the benefits they provide (see below). It will also show a variety of options for speaker placement to ensure the most effective experience possible.

Solfeggio Frequency	Benefits	Chakras
174Hz	- Natural Anesthetic - Heals Physical Pain - Heals Emotional Pain - Increases Courage - Cleanses Aura - Emotional Wellness	
285Hz	- Rejuvenates - Regenerates Tissues - Heals Internal Organs - Increases Energy - Immune System - Heals Auric Field	
396Hz	- Liberates Guilt & Fear - Turns Grief Into Joy - Cleanses Negativity - Empowers Goals - Inner Peace - Root Chakra	
417Hz	- Facilitates Change - Enhances Creativity - Clears Negative Energy - Manifests Intentions - Cleanses Trauma - Sacral Chakra	
528Hz	- Love Frequency - Transformational - Divine Miracles - Self Confidence - Restores DNA - Solar Plexus Chakra	
639Hz	- Attracts Love - Positive Energy - Balances Emotions - Heals Relationships - Brings Harmony - Heart Chakra	
741Hz	- Self Expression - Problem Solving - Cleanses Cells - Cleanses Viral Infections - Purifies Body & Mind - Throat Chakra	
852Hz	- Return To Spiritual Order - Awakens Intuition - Raises Cell Vibrations - Awakens Inner Strength - Bridge To Higher Self - Third Eye Chakra	
963Hz	- Christ Consciousness - Pure Miracle Tone - High Level Intuition - Telepathy - Psychic Vision - Crown Chakra	

Ancient Healing Tones

Dogood, S. (2022) Music | Positive Energy Binaural Beats 777Hz and the Science of Solfeggio Frequencies. Available at: <https://www.everythingneurodiversity.com/post/music-positive-energy-binaural-beats-777hz-and-the-science-of-solfeggio-frequencies>.

Simply striking the hockey puck, which my research showed was the most effective thing to use to create pure harmonics, with a tuning fork of your choice you then place it on the aluminium plate. The contact sensor will pick up the vibration and send the signal to the amplifier. If the user wants to create binaural beats with the ZenDen they can do this by having two different

tuning forks, one for each side of the head and placing them on different aluminium plates with their own contact sensor. Which then sends the vibration to the amplifiers on the opposite side of the head/body thus activating a binaural effect.

Issues I encountered developing ZenDen

Like anything new, there is always a process of trial and error. In my case, I had to explore which frequencies to focus on, where to source good-quality tuning forks on a student budget, and how to transmit the frequencies to the amp without losing the true resonance of the forks. How to connect the forks to the sound distributor (amp). Also how to minimise interference between the contact sensors and the surface they are placed on and the forks whilst the sound is transmitted. I also had to consider the length of the cable between the amp and the sound distributor and how to minimise interference yet create a surround sound set-up. All whilst working on a small budget.

When I initially started to look into sets of tuning forks, I found that there were a lot of different types, ranging from cheap (£10) to expensive (over £1000). Whilst there were a lot of online retailers who claimed to sell tuning forks sets containing the full solfeggio scale at a certain price (within my budget), however, the quality of the forks was reportedly more than 2-3hz out of the advertised hz rendering them useless for the purpose of this project. Some were as much as 10hz out of tune. So this limited me to only focusing on one or two quality companies for the tuning forks to ensure they had the healing properties required for the instrument to be fit for purpose and therefore only focusing on one or two types of tuning forks for the prototype. The Company I have chosen is

<https://www.raggtuningforks.co.uk/product-category/ragg-tuning-forks/healing-tuning-forks/>

Next, I had to consider what material to use to create the plate that the forks would sit on and the contact sensor would be placed on. My research included experimenting with pans and trays. However, after further reading, I discovered that aluminium was a far greater sound conductor so I ordered some small sheets which seemed to work well. However, there was an issue when these aluminium plates were placed on certain hard surfaces as they vibrated on the surface creating a sharp piercing sound, so placing something soft underneath was necessary.

I liked the idea of using a guitar pick-up sensor but it seemed to add a lot of static to the sound and this suggested to me that it would undermine the healing properties of the sound.

The contact sensors seemed to be the best option as they were transmitting a tone that sounded a lot closer to the original tone of the tuning fork, unlike the pick-up. However, the contact sensor was very sensitive to other objects touching the plate and as a result, it became difficult to keep the tone produced by the fork unaffected whilst on the plate or on other metal or objects containing metal.

This suggested to me that it would be most suitable to use a conductive plate that perhaps had a coating underneath or came with an additional tray that prevented unwanted transmission of sound. This again would need to be tested to ensure the plate and fork were not affected.

For the purpose of this project, working within current means, I was limited to testing with 2 amps so I did not quite have the full surround sound or Dolby Atmos impact yet and therefore testing of the full immersive vision has not yet been possible. However, I was able to create a binaural impact and used the actual tuning forks as an additional 2 points of a sound source around the body.

Future Developments and Improvements

There is a lot of scope for further development of the project, from both a technical and design perspective. Also from a commercial standpoint, after speaking with Dolby Atmos I know there is a clear market for this type of product. Partnering with Dolby Atmos and a tuning fork manufacturer would give the project credibility and a captive audience plus result in a large reduction in manufacturing costs.

From a technical standpoint, the ZenDen could potentially use a plate with sensors built-in and a protective coating to ensure the fork did not create feedback resonance from whatever surface the plate was placed on as this was an issue when conducting the initial tests, which took away from the desired 'relaxing' sound therapy effect.

From a design perspective, the plate could be made more visually appealing and also have a fork holder built into the top.

Further to this I would also like to explore the possibility of incorporating a trigger response for light, so depending on the frequency and movement of sound different colour lights would be triggered. Taking the user on both an auditory and visual journey.

Having attended yoga studios where they use this type of lighting, combined with specific meditation music inside a 'pod' which is an inflatable room that is additionally heated to sweat out impurities. This also gave me the idea that partnerships could be made with yoga studios so that I could replicate this concept but focus on the healing properties of the sound within a pod environment. Which could work very well at festivals and other events.

As mentioned previously I discussed that I was limited in the creation of this due to budgetary restrictions and so only focused on 174hz as this was the frequency which was the most popular healing frequency used by Biofield practitioners and also 528hz which is commonly called the miracle tone or the love tone. However, a fully functioning ZenDen would have all the 9 solfeggio frequencies and Chakra frequencies. Giving the user between 9 and 16 different frequencies to choose from. In addition, the user could have the option of listening to them on smaller portable speakers or large sound systems.

It could also be combined with a meditation app such as headspace to combine the healing properties of the sound with guided meditation.

I also own a Life Stream Generator (see link for more information) and I would like to run some tests to see how recipients might benefit from a sound healing session combined with a Life Stream Generator session as this omits chi energy and recharges the cellular voltage so it might positively impact the user to first have a ZenDen session before using the LifeStream Generator. <http://www.zeropointresearch.com/>

Additionally, to make it potentially more portable and easier to use, the ZenDen could be incorporated into an app that could Bluetooth the sound to a set of surround sound speakers. With presets for different binaural beat frequencies. However, the purity of the sound would be the main focus and so this would need to be tested.

Conversely, another area I'd like to explore is a way ZenDen could protect or balance out the negative effects of the unnatural frequencies we are surrounded by every day. Electromagnetic fields (EMF) are believed to harm human health. Studies have linked exposure to EMF with an increased risk of cancer, reproductive issues, neurological problems, and more.

‘A pooled analysis of nine studies reported a twofold increase in the risk of childhood leukaemia among children with exposures of 0.4 μ T or higher. Less than 1% of the children in the studies experienced this level of exposure (26).’

Electromagnetic Fields and Cancer (2022). Available at:

<https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/electromagnetic-fields-fact-sheet>.

Some common sources of EMF include electronic devices, power lines, and Wi-Fi routers. While further research is needed to fully understand the extent of EMF's impact on health, it is generally recommended to reduce exposure whenever possible by using wired internet connections and limiting the use of electronic devices. This is quite a wide topic so a more scientific and technical approach would be required for a more complete understanding of how ZenDen could support this.

Market Analysis

The market for sound healing tools has been steadily growing in recent years, with an increasing number of individuals and practitioners incorporating these tools into their wellness routines. The main types of sound healing tools include singing bowls, gongs, chimes, and tuning forks. Singing bowls and gongs are the most popular and widely available tools followed by chimes and tuning forks. The market for sound healing tools is highly competitive, with many manufacturers and practitioners offering different types of tools and services. However, the market also offers many opportunities for growth and innovation, particularly in the area of technology-enabled tools and services.

The most notable competitors outside of the aforementioned Biofield practitioners and sound bath healers are sound healing tool manufacturers and retailers such as <https://lovetunereurope.com/> and <https://nowbysolu.com/collections/>. The LoveTuner is a

necklace that is similar to a whistle and is designed to resonate at a frequency of 528 Hz when blown. It is designed to help people feel more relaxed and calm and also attunes their field to the frequency of love. However, it is only for personal use and does not claim to heal or cure anything.

The n.o.w. Tone therapy is two speakers with preprogrammed randomized soothing music that replicates sound healing bells and bowls that are designed to be listened to for 3 minutes by placing one on either side of you and is influenced in a similar way as ZenDen to help soothe but is marketed as a meditation technology. Hence the name n.o.w.

‘The tuning reference is A-432. The frequencies of the tones range from C-256 to C-512 with prominent use of C-256, D-288, E-520, G-384, A-432 and C-512. These pure tones, and precise intervals, are based on the naturally-occurring harmonic series--the same series used for sound healing therapy by Pythagoras 2500 years ago.’

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<https://nowbysolu.com/pages/frequently-asked-questions>.

User Feedback

Whilst ZenDen is still in its prototype stage, initial feedback has been extremely positive. One user stated that it helped him recover his nerves ahead of a high-pressure presentation and he actually asked to buy it!

Additional feedback has been that the ZenDen has created a sense of calm and relaxation with immediate effects on the body. However, at present, I am still working with a fairly limited range of frequencies, and also with only two amps. So true user feedback has not been obtained according to the full scope/concept of ZenDen.

There is however more concrete user feedback from tuning fork healing sessions out in the general marketplace. This includes the below image where we can see the effects of tuning forks

on the body's electromagnetic field can actually be measured, using a special Kirlian Camera. See below for some before and after pictures.



Kirlian Photo of Aura before Tuning Fork Therapy



Kirlian Photo of Aura after Tuning Fork Therapy



Kirlian Photo of Aura before Tuning Fork Therapy



Kirlian Photo of Aura after Tuning Fork Therapy

Positive Health Online | Article - *Tuning Forks for Healing Therapy* (no date). Available at:
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To Conclude

The ZenDen prototype aims to combine advancements in sound healing and sound design technology to provide a flexible and sustainable approach to audio therapy. The ZenDen has been designed to provide a modern-day sound bath that can be used by anyone and deliver a relaxing, meditative experience to the user while listening to healing solfeggio tones.

Whilst the prototype has received positive feedback from users, further, development is required to expand its range of frequencies and incorporate full surround sound impact and solve the aforementioned design and technical issues and includes developments.

This may include creating an app and partnering with other companies that already have established tools and technology in this field.

The market for sound healing tools is highly competitive, with many manufacturers and practitioners offering different types of tools and services. However, ZenDen's unique features and benefits make it a promising product for the future.

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