Enhancing inner balance in everyday lives

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ABSTRACT

This study aimed to understand how mindfulness breathing and observation meditation affect people's sensory experience. The objective was to design and develop a mindfulness breathing trainer to help meditation beginners improve their state of being unable to focus on mindfulness meditation practice and help them adjust their breathing rate. This article explores intervention with the meditator in multiple ways to get into an effective meditation state. For example, each color will have a substantial impact on people's thoughts or subconsciousness. Therefore, it is very effective to try to use color to improve their health, mood, or life efficiency. Understanding each color's characteristics and how to choose a specific color according to particular needs can effectively guide the meditator. At the same time, we will study the positive effects of sound and other methods on meditators and obtain enlightenment in the in-depth study in this field. In combination with applicable techniques, the known effective mindfulness practice methods are used to enable meditators to practice mindfulness meditation more effectively.

Keywords: Meditation, Mindfulness, Deep breath, Relax, Attention, Immersive meditation

1. Introduction

In modern society, with the accelerated pace of life, pressure increases, and depression is rampant. After a long time of intense mental work, people will be mentally tired, dizzy, have memory loss, and inattention. People can achieve three effects through meditation or relaxation activities, especially deep breathing: first, it can lead to α brain (Lagopoulos et al. 2009) waves; Second, it can reduce energy consumption; Third, it can reduce the concentration of lactic acid in the blood, relax muscles and brain. Therefore, it can quickly eliminate fatigue and disperse pressure. So, more and more people begin to practice meditation.

Mind, light, color, energy, and breathing are all factors that may potentially affect the effect of meditation. First, let's talk about the color. Distinct colors have different wavelengths and frequencies (Srinivasan et al., 2017), so there will be different energy. Color will stimulate the human body's energy change, affecting people's mood, psychological balance, and physical function. Everyone is affected by the vibration frequency and energy magnetic field of the human body's internal system in diverse ways due to different physiques and then send out different responses to different colors. Color therapy uses color to make the energy center of the human body reach a balanced

state (Rodrigues et al., 2016). When the body function changes, the body energy can be balanced and adjusted by the energy brought by color. The energy state of the whole body through the brain, through the guidance of ideas, changes the state of self-energy frequency; this defines meditation and the essence of different color meditation.

People can meditate on different colors through the concept of meditation and then feel the energy of different frequencies of light behind the color so that these energies can affect the state of self-energy frequency.

The second is light. Similarly, light can also help people release tension (Brown et al. 1984), self-regulation, and get a space for meditation. The use of light is particularly important, as it shapes people's perception of meditation space with light; making space extend beyond its physical structure to people's spiritual level through the subtle changes of light, shadow phenomenon, and tone level and is a kind of artistic conception of space to be created by meditation space.

We use techniques to alleviate people's emotions to create a meditation trainer, which can significantly help people manage emotions and balance their minds.

Suppose you have ever felt pressure or are in anxiety. In that case, you can interpret your emotions according to the different emotions corresponding to each color, followed by breathing or meditation practice, which can make you experience the subtlety of emotional changes, and your life becomes more colorful in between.

1.1 Background

Around the world, more and more people are reporting stress and anxiety. The World Health Organization says the number of patients with depression or anxiety increased by nearly 50% between 1990 and 2013. According to the WHO website, the number increased from 416 million to 615 million. Employees who are too stressed and anxious cannot stay focused and are inefficient. As the world continues to cope with the negative impact of the Covid-19 pandemic, a large part of the World's population continues to struggle with their mental health. The Covid-19 epidemic has had a significant impact on our lives. Many of us face challenges that can be stressful and unbearable and trigger strong emotions among adults and children. For some people, this may affect work, sleep, etcetera. Others may have severe mental disorders. For example, people with neurological disorders such as anxiety have irrational thoughts and fears about the future. Often they cannot control these thoughts and cannot cope with the stress. The best-known benefits of meditation are those related to factors that affect an individual's mental health. So many people begin to practice mindfulness meditation (Eberth and Sedlmeier. 2012) to solve their mind problems.

1.2 What is mindfulness meditation

Mindfulness meditation is an exercise and a tool to realize mindfulness. Mindfulness means that the practitioner pays attention to doing something in a specific way, pays attention to the present, and does not make any judgment mentally. Meditation is a formal practice that calms the mind and enhances our understanding of ourselves,

thoughts, and the environment. It emphasizes that during meditation, we consciously maintain our attention within the present and know any rising thoughts and feelings without judgment.

1.3 Benefits of meditation

Meditation has many benefits. It is also an art of life that enables people to get rid of mental pressure, emotional anxiety, and energy and give full play to their potential. Meditation methods have been used for a long time and have been shown to work.

In the broad definition, meditation is a way of taking control of the mind, this method makes our mind calm and focused, and the meditator becomes more aware.

As a physical and mental exercise, meditation focuses on the interaction between the body, brain, soul, and behavior.

1.3.1 Increases creativity

Neuroscience and psychological research have shown that meditation can improve creativity, help make plans, let people see long-term benefits and reject immediate benefits, which are very important to improve work efficiency. However, many of our activities have not had such a far-reaching impact. For example, research in Psychological Science journal shows that we meditate in what researchers call "incubating creativity."

1.3.2 Reduces anxiety level

Several studies have shown that meditation and mindfulness intervention positively affect brain activity. Practicing meditation can help people reduce stress and anxiety because it can combat anxiety disorder symptoms. (Hoge et al. 2013) Meditation can help people improve their emotion regulation, especially patients with social anxiety (Goldin and Gross. 2010).

1.3.3 Improves memory

A multinational joint study shows that regular meditation can relax the body and mind, maintain brain vitality, and help prevent amnesia such as Alzheimer's. Meditation can stimulate the generation of new brain cells, slowing the brain's aging. In addition, relaxation and a pleasant mood during meditation can also help the brain maintain a good state. A 2014 study by Harvard University in the United States showed that meditation could make the gray matter in the brain related to learning and memory thicker and denser, which helps to improve memory and learning ability.

1.4 Problem

For beginners of meditation, in the process of learning how to meditate, the main reasons affecting meditation include that there are many thoughts in the process of meditation, and it is easy to be distracted. As a result, it is easy to fall asleep during meditation, and many people cannot choose effective meditation methods.

It is difficult for the human mind to stay in the present. A Harvard University study found that people spend 46.9% of their waking hours thinking about things other than what they are doing (Steve B. 2010). Of course, this kind of mindlessness is expected, as the mind spends its time focused on the past, the future, or muddling in should have's and what-ifs.

1.5 Case study

Many companies realize that bringing mindfulness meditation to the workplace reduces employees' stress levels and improves concentration, mental clarity, listening and decision-making skills, and overall well-being. From a management perspective, perhaps most importantly, mindfulness allows employees to think. Mindfulness is the essence of active engagement. Focus entirely on the present.

Google realized the benefits of mindfulness meditation to enterprises and employees and created an immersive meditation space for employees. (Figure1)

Figure 1 Google's Bay Area Offices Photography by Tom Harris

Google cooperates with the US design company office of things to create an immersive meditation space for employees in Google's Bay area headquarters. The design aims to create a simple space that anyone can use as part of a particular meditation practice or just a place for the brain to rest for a few minutes. In the room, users can choose to run different lights and sounds to create a relaxed and sober atmosphere.

Figure 2 Om Meditation Pod (Alberto Frias)

Figure 2 shows the meditation pod is a soft LED lighting, sound and space environment. The pod facilities meditation by allowing a person to relax inside an aura of colored light and ambient sound. Om looks like a cocoon. It has a comfortable internal space and a white oval external structure. When you sit inside, you will feel the meditative atmosphere brought to you by colors and resonant sounds, which will give you a personal immersion space.

Figure 3 shows that in early September 2016, the breath application on the Apple Watch was launched as an integrated function of watches 3. This popular Apple Watch app helps you relax and focus on breathing. Follow the animation as it grows with the inhale and shrinks with each exhale. Feel haptics feedback to guide your deep breath as you inhale and exhale.

The core of the above space or product is the physical environment enhanced by technology or lets people focus on breathing by observing animation or tactile feedback to help people maintain balance and concentration, release pressure and maintain a relaxed state to achieve the purpose of mindfulness practice.

Figure 3 Apple watch mindfulness breathing function (Apple Inc.)

2. Objectives of the study

2.1 Study how to maximize the use of meditation equipment to help people practice inner meditation, adjust their emotions and improve their ability to relax or meditate.

2.2 Create a prototype of an assisted relaxation meditation device.

3. Materials and Methods

      3.1 Through the collection of website information, study the problems encountered by meditators in the meditation process and collect what problems they have to solve.

      3.2 Study the potential impact and mechanism of light and sound on people.

      3.3 Design and try the circuit part of the equipment. In continuous experiments, it has been found that Arduino embedded hardware platform can provide safe sensor embedding and device control for the equipment. At the same time, Arduino project integrated development environment based on processing language provides a sound programming environment for the equipment.

      3.4 Select the most suitable material for prototype manufacturing according to different material properties

      3.5 Safe and effective combination of circuit parts and equipment.

4. Results

      4.1 Factors affecting and enhancing inner balance

          4.1.1 Positive effects of light and color on the human body

      Light plays an essential role in life. Since the beginning, exposure to natural light has always been regarded as an essential part of physical health.

      Combine the positive benefits of light (Lindahl et al. 2014) with stimulating a specific sense to maintain happiness. Ayurvedic medicine and traditional medicine (TCM) provide a perfect system to diagnose and treat diseases. There is also much Western scientific research and clinical evidence show that the all-optical spectrum and specific spectrum colors maintain health.

      In 1878, Edwin Bartlett published Principles of Light and Color. Bartlett put forward the comprehensive theory of "chromo therapeutics" for treatment. He believes red is a stimulant, especially for liquid, which can stimulate nerves to a certain extent; yellow and orange are nerve stimulants. Blue and purple are soothing agents for all systems and have anti-inflammatory properties.

      Russian scientist S.V. Krakov supported Luscher's theory in the 1940s. He determined that red stimulated the sympathetic part of the central nervous system and blue stimulated the parasympathetic part. In 1958, Robert Gerrard confirmed his discovery. Gerald found that red produces excitement, making anxious or nervous subjects feel uneasy, and blue produces a sense of calm and happiness with calm action. Although cautious about his findings and insisting on the need for further research, Gerrard highlighted the possible therapeutic benefits of blue. He suggested it as a complementary quality method for treating various diseases (Liceo. 2012).

      The theories, research and information, cited provide evidence that color therapy can change the theories of reason, reason and emotional health; Therefore, color therapy is beneficial for those under pressure.

4.1.2 *Brain wave*

Scientific research shows that the brain can produce four types of brain waves: When you are nervous, your brain produces β Waves; When you feel sleepy, brain waves become θ Waves; Into deep sleep, they become δ Waves; When your body is relaxed, your brain is active, and your inspiration is constant, it is derived α Brain waves (Figure 4).
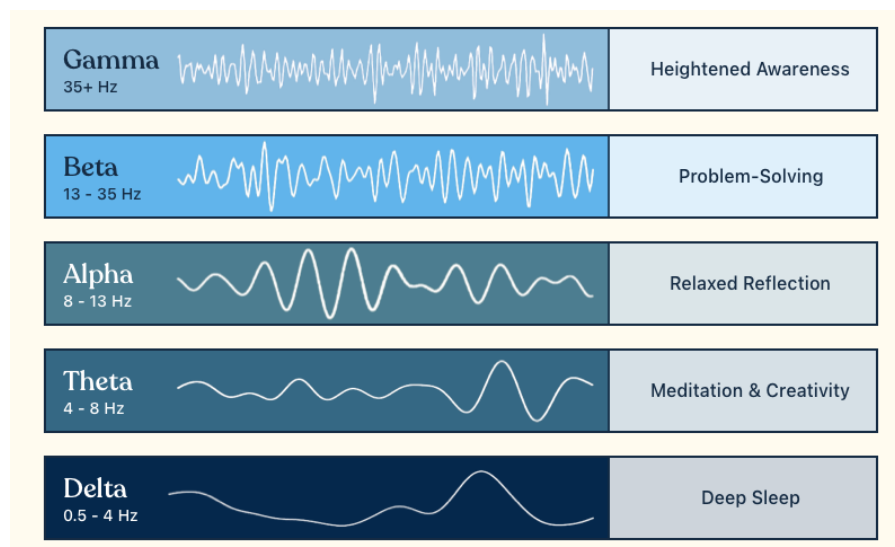

Figure 4 Different brainwave samples correspond with particular states of mind. (fitmind.com)

When brain waves work, the hormonal system can produce various hormones and reactions according to the situation you experience. You can also experience happiness, sadness, anxiety, or calm due to work brain waves. Everyone experiences unique brain wave changes according to their level of consciousness. These brain wave patterns can determine your mental state. Brain wave therapy uses sound technology or is familiar with meditation music, uses sound waves adjusted at a particular frequency and then listens repeatedly to affect the brain's response.

Healing music is music with a beat of 60-70 and a frequency of 8-13hz α Brain wave music. This music is characterized by a slow melody, simple rhythm, and moderate volume. Some are also equipped with sounds such as water and waves to strengthen the effect of meditation and hypnosis. Therefore, listening to healing music induces similar changes in the human brain's α waves; the state of brain waves (the vibration frequency of sound waves can induce the assimilation of brain waves), which promotes people to relax and improve sleep to a certain extent.

4.1.3 *Mindful breathing*

Mindfulness requires a perceptible object, whether breathing, body, thoughts, emotions, or environment. Therefore, breathing training is an essential part of meditation practice. However, for beginners to meditate, it is almost impossible to remove all thoughts and enter the state of meditation as soon as you sit down. So there are many ways to help us calm down first to reduce our thoughts. Mindfulness breathing is one of them.

In 2017, Valentina perceivable, a scholar from the University of Catania in Italy, published a study on the effect of deep breathing on stress relief in the Journal of neuroscience; They recruited 38 young people aged 18 to 28 and divided them into two groups. The experimental group received compression treatment ten times a week, including practicing deep breathing, for 90 minutes each time. The other group was the control group; that is, there was no intervention of any compression treatment course. The study used the mental stress scale to evaluate the psychophysiological state and measured the values of heartbeat and cortisol in saliva. The results showed that deep breathing exercises could effectively reduce the stress index. In addition, studies have shown that long-term mindfulness breathing training has beneficial effects on cognitive function and emotional regulation.

4.1.4 Object Meditation

Object meditation is a kind of visual meditation that involves external physical elements, such as candles, flowers and other objects. Object meditation is ideal for beginners because it can help us improve our attention without mental activity. We focus our consciousness on an object and observe it. Giving the brain something to occupy helps it focus. Observing these objects is an effective way to prevent thinking dispersion.

4.2 Design of a mindfulness breathing guidance trainer

The purpose of meditation is to concentrate and relax your mind. Design a product based on the above potential factors to improve the effect of meditation. Finally, more precise control of the meditator's self-consciousness and inner peace is achieved. The product can effectively guide them to control their breathing with moderate frequency and make them feel relaxed and awake using light, music, and observation meditation. The product aims to cultivate the meditation experience by promoting the user's sense of immersion while following mindfulness's specific attention pattern characteristics so that users can benefit for a long time.

4.3 Material

4.3.1 Build with Arduino controller

Arduino is an open-source electronic prototype platform, including hardware and software. It can sense the state of the surrounding environment through various sensors and then use software to control the hardware. In recent years, Arduino has been applied in art design. And Arduino has important applications and significant advantages in product development.

Use Arduino for development. Imitate the opening and closing of flowers in nature for visual feedback. The meditator observes and follows the opening and closing of flowers to guide the breathing speed. (Figure 5) Show the circuit connection diagram of Arduino of this design work.
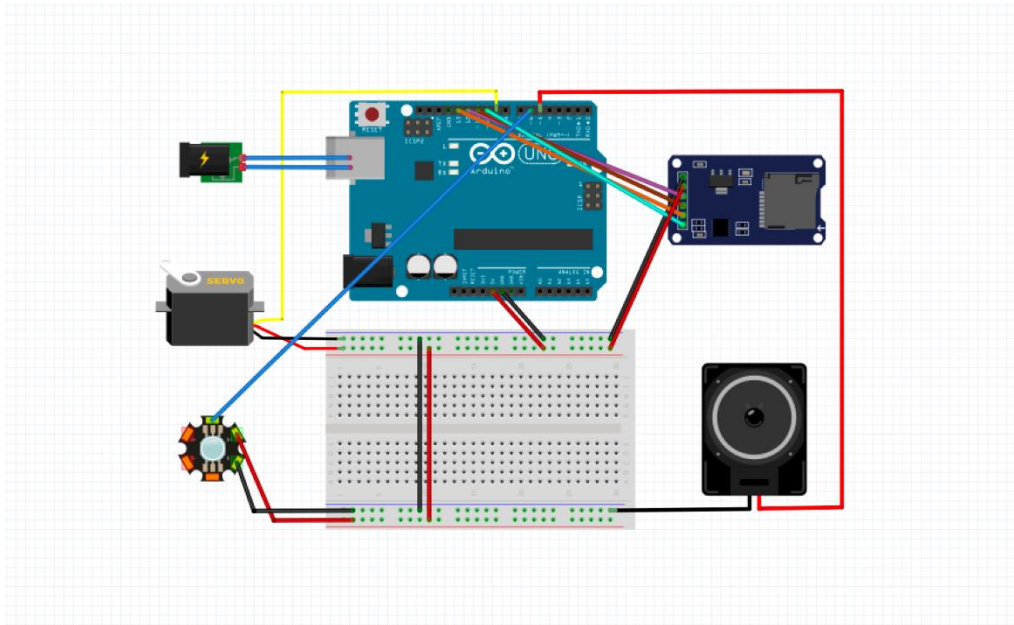
Figure 5 Arduino circuit connection diagram

4.3.2 LED brightness and color control

RGB lamp is imaged by the common intersection of three primary colors, which has more diversified characteristics in light color mixing. We use an RGB lamp to display different colors of a lamp. It can be used to indicate different states. At the same time, the program can control the brightness and darkness in the development process to keep consistent with the flower opening and closing frequency. At the same time, the value can be adjusted to control the color of the LED (Figure 6).
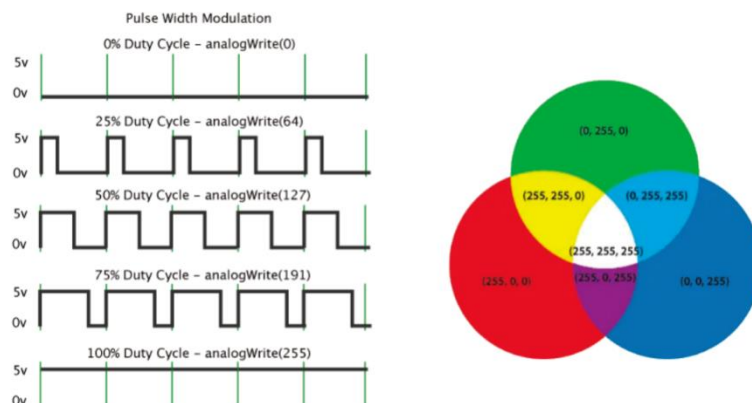
Figure 6 Schematic diagram of Arduino controlling the brightness and color of LED lamp

4.3.3 Meditation music playback and storage module

The main components of the Arduino-based music player project are the Arduino board and SD card module/adapter (Figure 7), and the module interface adopts the SPI protocol. The audio files stored on the Micro SD card are read by Arduino with the help of the SD card module and played through the speaker. Convert the prepared sonic music with specific frequency adjustment into WAV format and store it on an SD card. Then, when the user turns on the device, he can hear the music in time to help improve the meditation state.
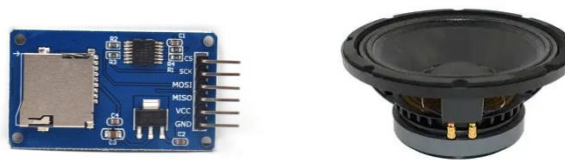
Figure 7 SD card module and speaker

4.3.4 Mechanical opening and closing control

The analog steering gear selected in this design is a servo motor (Figure 8). The utility model relates to a servo driver for position and angle. By connecting the Arduino programming language, we can meet the needs of this product and the control system where changing angles can be maintained. The steering gear must always give the PWM signal of the target angle. It must send the same square wave repeatedly until the steering gear rotates to our designated position. Similarly, we can control its rotation speed with code.

The action effect of opening/closing flowers can be realized through the transmission rod and steering gear link. And you can write code according to your needs to set the synchronization with the LED lighting effect.
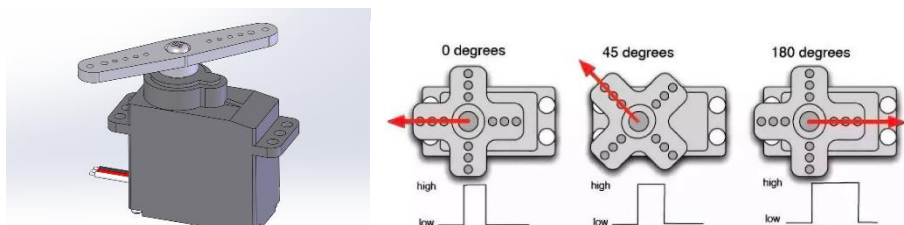
Figure 8 Servo motor and the rotation description micro servo motor model by Henning Forbech

4.3.5 Code write and realize part control

This product is designed and applied with Arduino intelligent hardware and uses various sensors and actuators. At the same time, using C language code can help better control signal and transmission in the actual situation of the project. The electronic part of this product is a combination of hardware and software to

complete the more accurate control of circuits and mechanical parts. Use Arduino IDE (Figure 9) to write code and upload it to Arduino for the resulting test.

The code written and applied to this product includes.

3.1   Control the brightness and color setting of the LED lamp.

3.2   Control of steering gear speed and machine angle.

3.3   Storage/reading/playing of meditation music, etcetera.

Figure 9 Code development software IDE interface

4.4 Experiment

4.4.1 Experiment on light transmittance of flower materials

To better let users observe meditation, use the light color to affect meditators' nerves effectively. I experimented with the light transmittance of the material used to make flowers. In Figure10 a-d, PET plastic pulp recycled paper aluminum HDPE plastic is selected for the experiment.
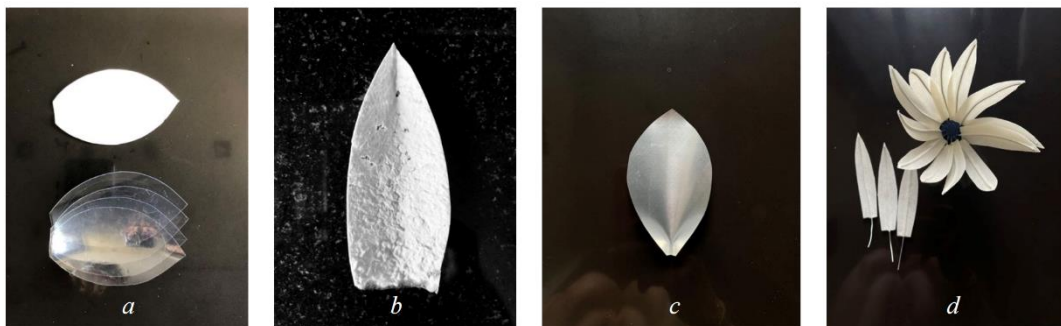

Figure 10 Make flowers petals of dissimilar materials.

PET plastic has beautiful irregular shape changes after baking, which makes the refraction of light gorgeous. As shown in Figure 11, the petals are made of high-baked plastic.
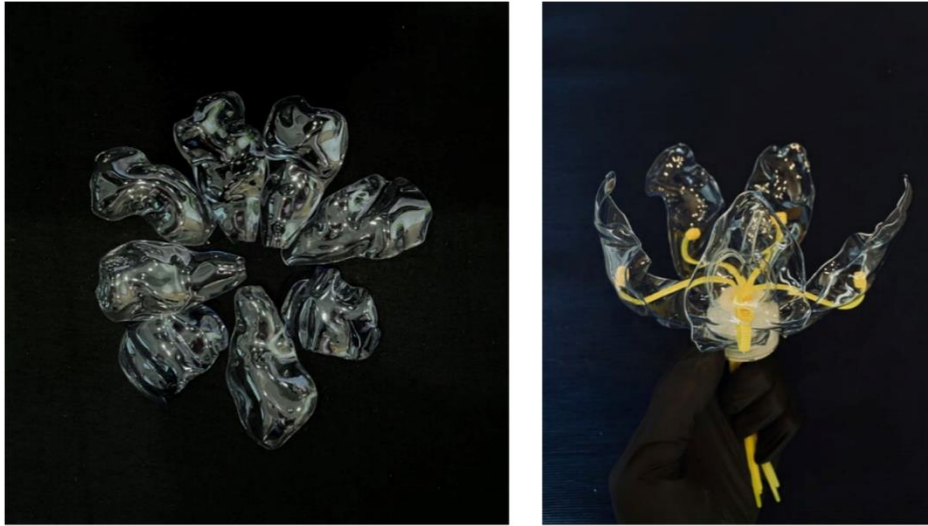
Figure 11 Petals made of baked PET plastic

4.5 Installation and commissioning of the circuit and mechanical parts (figure 12)
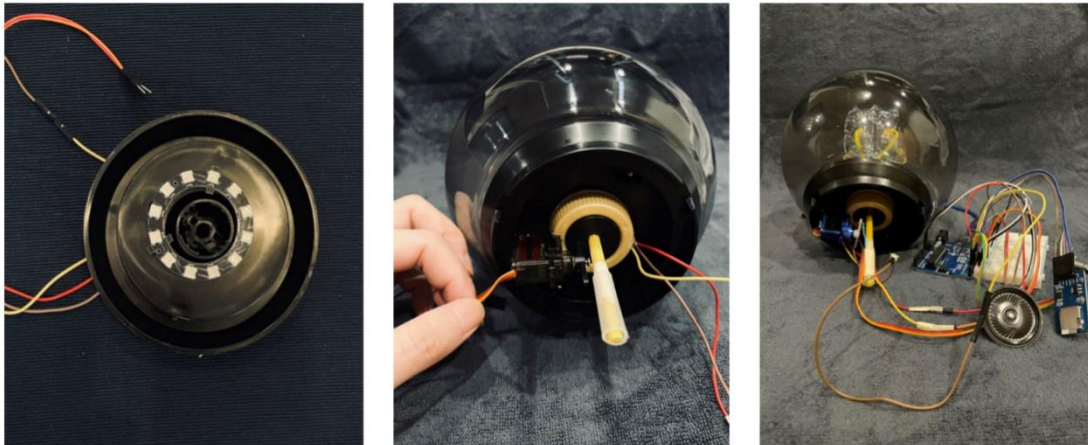

Figure 12 LED lamp circuit and mechanical parts

4.6 Prototype of the design

The top glass cover can ensure the light transmittance of simulated flowers and effectively prevent accidental touch. The middle LED light ring is placed at the bottom of the flower and can project the light of the required color. At the same time, it can illuminate the flower so that the user can more clearly observe its changes. Finally, the bottom tray can hold the Arduino motherboard, battery, and other accessories (Figure13).
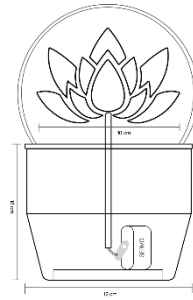
Figure 13 Dimensional drawing of the parts

4.7 Product usage instructions

Choose a quiet place that allows you to focus on mindfulness training without being disturbed by external stimuli. Choose a comfortable sitting position and relax. Keep the guide trainer in front of you at a 45-degree angle to your eyes and body. Focus on observing the object and keep breathing in sync with the opening and closing of the flowers' lights. If you concentrate on such flowers, you will feel that you have entered a deep peace without the interference of foreign objects.

Normal breathing value is when adults breathe quietly for 10-12 times per minute, and the opening and closing of flowers are set to 7-9 times per minute to achieve deep breathing. Focus on observation and take a deep breath until you gain concentration and complete peace.
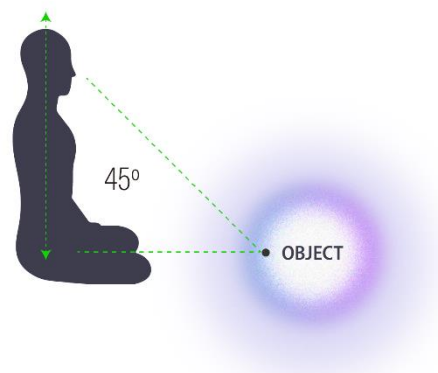

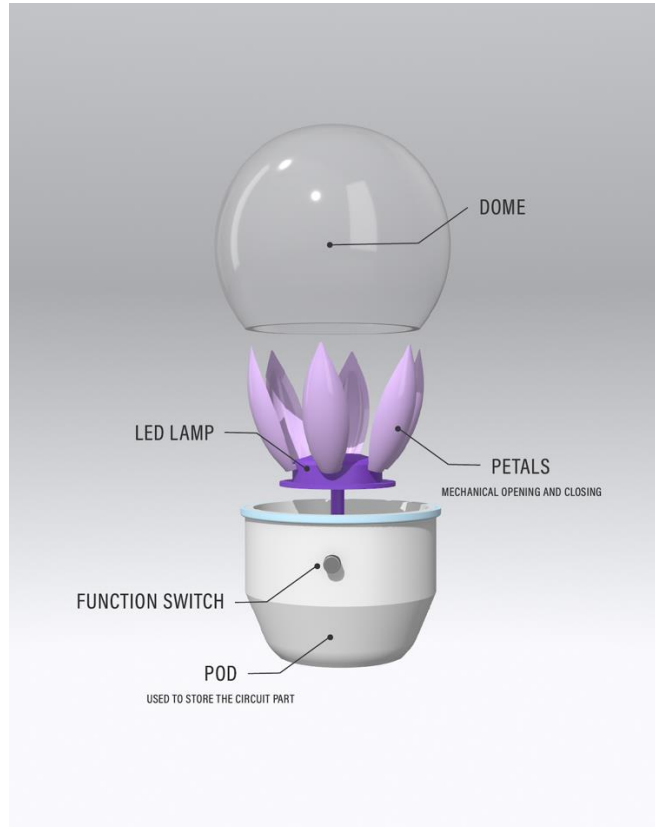Figure 14 Mockup illustrating how to use the designed guidance trainer

Figure 15 The 3D design of the exterior (breakdown drawing)

Figure 16 The completed prototype flower in open and closed status during operation

Figure 17 The computer design of the prototype shows the use environment of the trainer.

5. Conclusions

This study proposed the design of a mindfulness breathing guidance trainer to help people complete their deep breathing and focused observation exercises in the shortest time. Slow deep breathing can affect modern people's problems, such as stress and inattention. Scientific and medical studies have shown that slow breathing can help reduce tension, stress and anxiety. Mindfulness breathing trainers can effectively deal with the tense moments of the day by following the changes of light, opening and closing flowers, and focusing on slow breathing. Take a deep breath following the light changes and opening and closing of the flowers.

This design combines mindfulness breathing with observation meditation exercises. At the same time, playing meditation music, music and mindfulness practice will deepen the positive effects of both. Use those meditation guidance beginners to achieve concentration and calm. Focus your attention on your mind and practice enhancing people's inner balance.

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