

Evaluative Report on Final Design Solution for Major Project Module

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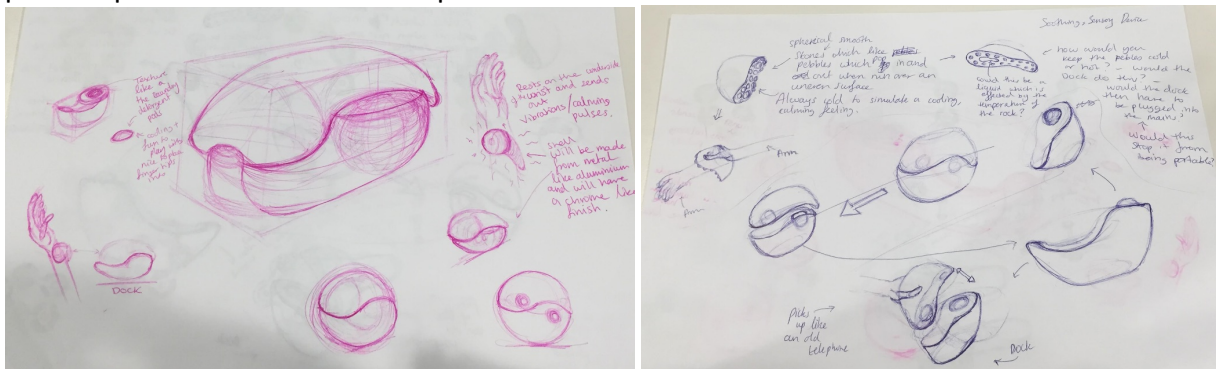
BSc (Hons) Product Design and Technology

My final design solution is a handheld, portable anxiety relief device named Palm. The device's purpose is to relieve symptoms of anxiety quickly - within minutes - in any given environment. The device does this by releasing pulsing vibrations which have been designed to mimic common breathing techniques proven to relieve symptoms of anxiety. The device also gives the user live biofeedback by monitoring their pulse and Heart Rate Variability (HRV). This biofeedback is expressed through a multi-coloured LED strip embedded in the device programmed to indicate the user's level of relaxation as they follow the rhythms of the vibrations. Palm comes with a docking station which can be used as a charging unit. Additionally it can be used as another way of gaining relief from anxious symptoms while the palm device is charging. This secondary function for the docking station can be used to relieve anxiety through playing calming tones of the movement of sand which follows rhythms of the breathing techniques that the hand held device utilises. Palm is targeted towards NHS users diagnosed with anxiety, and young people within the UK, typically aged 18-25.

From studies found in previous design research, I realised that one of the most important things a person needs to gain while in an anxious state is control. Anxious feelings arise through anticipation of a fearful future event or situation - the fear of not being able to control either the impending issue they feel they may be facing or their anxious feelings themselves. If you give a person something to control while they are feeling out of control, or in an overwhelmed state, then it will provide some form of relief and distraction. Hence why many of the products I initially looked into for relieving anxiety were small "fidget" devices which could be easily played with, manipulated and controlled. However, I quickly found that this fidget related design concept had already been well developed and through extended research I became less enthused about creating a solely fidget based product.

After further research into the causes of anxiety I found that when a person is anxious their Fight or Flight response is engaged (in other words they are in panic mode). Recent studies have shown that one of the most renowned techniques for relieving the fight or flight response is through controlled breathing. Many clinical psychologist and medical professionals now recognise the fact that breathing techniques have been proven to calm the fight or flight response quickly and effectively to relieve symptoms of stress and anxiety. Furthermore, the NHS themselves recommend breathing techniques as a method of coping with anxiety. Subsequently, I decided to create a product which incorporated the idea of relieving the fight or flight response through controlled breathing.

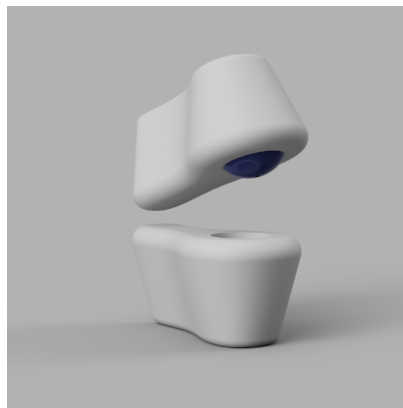
Initial ideas for creating Palm sparked from early sketches of a two parted product inspired by the Yin and Yang symbol designed to be used as an at home anxiety relief device that could be picked up and used whenever required.



Continued development of this concept led to user testing based on the idea of the top half of the yin and yang formed device (the hand held) becoming inspired by the shape of a stone which I had found on one of the Swansea pebble beaches.

The test user stated that they felt the stone was naturally very ergonomically shaped to suit their right hand and it was felt very comfortable to hold. They also were quite enthusiastic about the fact that the stone was cold and felt that this could be a nice quality for the device to have as it can feel quite soothing. From this the initial design proposal for a hand held device which delivered vibrating tones to calm the anxious user whilst also having a cooling surface temperature element was created.

The first CAD prototype of the device which would later become the Palm device is shown below:



As a result of my research on anxiety and market competitors I realised that it was imperative that my product measured the heart rate variability of the user rather than just their heart rate. This is due to several studies showing that the measure of heart rate variability can give a clearer insight into the emotions – specifically the anxiety levels – a person. Heart rate variability is the measure of time between each consecutive heartbeat, whereas the most commonly used ‘heart rate’ is the measure of beats per minute that the heart produces. The aim of monitoring HRV levels is to achieve a ‘coherent’ level of breathing, in which a person is breathing at a steady rate of cycles per minute to achieve optimal functioning of the nervous and cardiac system. From the research provided at coherence.com they have determined that an average of 5 breaths per minute will create an optimal level of HRV for achieving ‘coherent’ breathing in an anxious state. Following from this, my product is designed to measure the HRV of a user to determine as accurately as possible their anxiety levels, and therefore produce high quality biofeedback. The device also includes a mode button, with 4 different settings, which allows the user to alter the sequence and intensity of the vibrations in keeping with the 5 breaths per minute rule.

The copper plate for the device conducts users’ HRV levels from their fingertips and transmits the signals through to the device’s internal PCB to produce the correct lighting response signal for the user with regards to their live anxiety levels. The lighting response is delivered via the LED strip which will shine either purple, blue or green light relative to the users’ state of anxiety. The lighting orientated biofeedback element of the product is a crucial aspect of the Palm’s design as it gives the user a visual representation of their body’s current internal status and therefore a strong, simple platform for them to utilise in order to control their breathing and move into a more relaxed state. Purple and blue have been specifically chosen to represent the more anxious states of the user as they are less alarming colours than red and amber which are often used to represent negative emotions. This helps to ensure the product isn’t counter

effective by making the user feel more anxious by drawing further unwanted attention to the user. Unlike other market competitors for my product – such as the ‘Calmingstone’ employ a red to green colour scheme for indicating the user’s level of anxiety. Furthermore, as anxiety can surface at any time the Palm device includes a “discrete mode” button which allows the user flexibility to turn the lights on and off when using the product. The biofeedback will still engage when the user’s fingertips are placed on the heart rate monitor, however, when the user moves into more relaxed states there will be a quick vibration pulse change and the vibrations will then return to the original pace to keep guided the user through until they feel relaxed.

Initially I considered incorporating a screen into the docking station which would work in parallel with the handheld device and display the biofeedback as statistical data so users could monitor their pulse and anxiety levels numerically, as many apps nowadays do so. However, after speaking with several people on a Mindfulness course (who were hoping to find a new outlet for controlling their daily stress and anxiety) I asked them whether they felt it would be a beneficial feature for the docking station to have a screen, most answered no and some felt that it would make them more anxious as the numbers may seem quite alarming if they were high. Therefore confirming the biofeedback representation through a coloured lighting system would be sufficient enough. These test users also stated they liked the fact that the device had a discrete mode and was pocket sized and felt that these were impressive features for an anxiety relief product to have.

An essential feature for my final design solution, outlined in my original PDS, was that the product must be portable due to the fact that the occurrence of anxiety can be so unpredictable. By making the device portable, the user can gain relief from symptoms of anxiety, as soon as they begin to surface, from the palm of their hand. As women are almost 50% more likely to suffer from an anxiety related condition than men, the device would need to be small enough to fit into the common small sized pockets on women’s clothing, therefore allowing the user to take it with them in any situation. The original dimensions for the first prototype for the anxiety relief device was 140mm x 35mm x 40mm which was far too big to fit in most women’s pockets comfortably. It’s now evident in the physical development of my prototypes that through refinement of the design and incorporating feedback from user testing that the final design and dimensions of the Palm device are now of a much more portable nature; the Palm’s final dimensions are now 110mm x 55 mm x 25mm, which is smaller in length and width than today’s common iphone 6 models and later versions – devices which are commonly used by female and male consumers in today’s society.

In addition to erratic breathing, another common side effect of anxiety is sweating due to stress and the fight or flight response being triggered. Subsequently, I felt it would be a beneficial and unique, soothing feature for the product to have a cooling element. The change in temperature between the device and the user’s body surface temperature would be a further distraction from the anxiety that the user is experiencing, thus enabling them to engage further with the device and less with their anxious thoughts and feelings. Throughout the course of testing my prototypes I asked test users periodically, whether they agreed that the cooling element for the device would be an advantageous. More often than not, users answered they would like to have it incorporated as a feature for the device. Initially I looked into controlling the cooling element through incorporating electrical elements into the device which worked on the principle of the Peltier Effect. I also considered the idea of a heating element so that the device would seem like a ‘hot stone’. However, after extended research into this method and testing the temperature

concepts with electronic components, I found that it would not be possible to have an electronic cooling system in the device with the dimensions of today's current technology capability's and the set target price range for my product. Alternatively, I have proposed for the casing of the palm device to be wrapped in a Glass-Polymer Metamaterial which I found in previous research. This would ensure the device would have a cold surface temperature so it will still be cool and soothing to touch.

As wireless charging is becoming an increasingly adopted method for modern day devices, I decided it would be a useful feature for the device to have. I have chosen to use Qi induction charger for my product, and so Palm is compatible for charging with all other standard Qi induction charging units. Thus, if a user has a wireless charging port (for instance for their phone) which they keep at their work, they could charge or top up the device while working at their desk, reducing the worry of the device not being able to be charged with ease. When the device is charging, users can still gain relief through the calming tones that the dock plays. Additionally by incorporating an induction charging system this meant there were less perforations on the device, helping to keep the device looking as natural and stone-like as possible.

The battery for the Palm handheld has been designed to last, when fully charged, for 7 days (with usage of approximately two and a half hours straight, per day). This is an advantageous feature as the user will not have to charge the device on a daily basis like many phones and portable smart devices currently on the market.

My original intention when designing Palm stemmed from the vast growing public interest in mindfulness and meditation. This is becoming increasingly popular everyday as a method of improving well-being, especially mentally, and is even recommended as a method for coping with anxiety by the NHS. Mindfulness is the practice of bringing the body to the present moment and focusing on your body's the current status. One of the most common ways to practice mindfulness is through focusing on your breathing and practicing breathing techniques. Many people find it hard to get to grips with trying to control breathing patterns and just get too caught up in their train of thought. My product therefore helps people to engage easier with breathing techniques and can help teach the user how to do so. Equally, if they do get lost in train of thought then they can easily return back to the present moment and regain focus on their breathing much quicker with my product as it's the sensation of the vibrations will gently pull their focus back to their breathing.

Low retail cost was a parameter I set early on for my product as anxiety affects over 8.2 million people in the UK alone and the World Health Organisation have stated that "by 2020, worldwide, depression and anxiety will be the number one disability" indicating that the numbers are increasing. Therefore, I believe as this condition is affecting such a vast majority of the world's population it should be affordable for as many people as possible. As well as NHS patients diagnosed with anxiety, I decided to target my product towards young people in the UK aged 18-25 as I can relate well to this audience and in my survey I conducted on coping with anxiety in the previous module, over 60 responses were returned and 86.2% of them were by people aged 18-24.

The NHS has three main treatment solutions for dealing with sufferers of anxiety: counselling/therapies, prescription medications and breathing techniques. As of yet, the NHS do not provide any form of anxiety relief through a physical product, hence highlighting the gap in the market for the Palm. Upon previous research I had done on the NHS regarding sustainability, I found that the NHS are working on gearing their health care system towards

prevention over cure movement. The palm aims to help improve coping mechanisms for anxiety in patients and members of the public with ranged levels of anxiety, no matter the severity; that is why the Palm would also be available for to be purchased by consumers online. Research into the NHS's current budgeting and funding, regarding mental-health across the UK, has seen it be increased dramatically and so the economic feasibility of Palm appears to be possible.

As good design practice I have tried to keep the Palm product as sustainable as possible with minimal impact on the environment, where possible. However, due to the extremely high demand for this product, it would need to be mass manufactured, which in turn means that to keep the process as low cost as possible to suit the target market, plastic is the only realistic alternative for satisfying all these constraints. In light of this, I have opted to use recycled plastic as the main material for the device. This ensures creating a product with a much lower impact to the environment than creating a new batch of plastic completely for the devices. Additionally, as it's considered a green material, the NHS would be more inclined to invest in the product as they receive increased government funding for reducing their environmental impact. Furthermore, as the casing is entirely made from the recycled plastic thermoplastic material it can be sent back to the manufacturers of Palm to be reground and used in future moulds. Alongside using sustainable materials for the device I have also designed the palm to perform with an long lifespan, as the product can be easily recycled and is highly durable, it is not intended for use as a single use item and can be sent back to be repurpose once it is ready for disposal.

Beginning my design process I was unaware of existing products with the same aim as my own. However, as I researched further, I found several products and apps based on breathing techniques, practicing mindfulness & meditation and monitoring of heart rate levels in anxious states. One product I found which correlated strongly to my initial ideas for my product was the 'Calmingstone'. The Calmingstone is a device which as of yet has no record of being released on the market, however the product utilises heart rate monitoring and releases vibrating pulses to guide the user into a calmer state through controlled breathing. While the basis of their product has similar features to my own there are vital differences. For example, their product measures just the users heart rate and not HRV. Also my product incorporates a cooling temperature element. There were also other products I found on the market such as the Spire Stone, HeartMath and the Applewatch breathe app – all of which, including the Calmingstone too, had a high price range starting from £60+. The low price for my product make makes the Palm an affordable alternative to these devices while also having addition features.

There are several relations between my final design solution for this project and my personal design manifesto, one of the strongest being that the hand held device and the docking station being organic shapes. Early on in my manifesto I addressed the fact that I naturally tend to create very organic forms, often inspired by nature. This is reflected in Palm as its whole aesthetic is based on mimicking the idea of holding a stone - a naturally calming, grounding and soothing object.

Unintentionally, by choosing to create an anxiety relief product I have created a device which encapsulates my manifesto concept of positivity in design as the product's main purpose is to help the consumer feel better. Furthermore, it provides a solution to the problem at hand through an experience based method, which as highlighted in my manifesto, millennials would rather spend their money on an experience over buying something desirable.

As a unit the colour scheme for the hand held device and the docking station is symbolic of Yin and Yang – the concept of perfect balance between positive and negative energies. My very first intention of including yin and yang stemmed from the idea that anxiety is considered to be

a negative and unwanted energy, however it can be balanced out through utilising something positive. The idea that empowering people to harness positivity within themselves to alleviate their anxiety was inspiring to me. I felt it would be an interesting concept to portray in my design as it reminds the user that while anxiety can be a negative emotion, they can take that negativity and use Palm to turn it back into a positive. Another reflection of the yin and yang principle in my design is through the wireless charging element, in that, neither one can work without the other, both parts of the unit (the dock and the handheld) must be present together charge the device.

The presence of colour and intricate design detail was also highlighted in my manifesto, while the Palm device at the surface may not seem very colourful, the multi-coloured LED strip and patterns incorporated into the materials for the product are appropriate in relation to trying to keep a discrete, subtle and natural aesthetic for the device. Due to the nature of anxiety and how it is a very internal experience, I feel it would not have been appropriate to make a product with a loud, vibrant colour scheme.

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