The Hera Band: A Wearable Aid to Help Manage Everyday Menopausal Symptoms

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Abstract — This paper explores the contextual challenges and emerging trends in the healthcare and wellbeing for menopausal women. It presents my ongoing design product proposal that addresses key identified ailments resulting from the condition via an innovative wearable device that utilises emerging product trends and technologies.

With both physical and mental health and wellbeing becoming rapidly growing concerns across modern society, my proposal aims to provide help that offers physical relief to the user while offering real-time advice based on data samples collected from the wearable.

I. Introduction

"Hera" is a wearable device designed as a portable system that manages and mitigates women's menopausal symptoms through real-time health monitoring and physical treatments via fluid sampling and cooling technology.

The proposed technology centres around thermal adaptation to counteract the user's body temperature increasing through providing a cooling affect. The secondary aspect of the technology focuses on sampling sweat to collect data on the user's hydration, nutrient levels and specific hormones – oestradiol and cortisol. Hera's design is reflective of minimalist bracelet for a lightweight, elegant form. This promotes discretion while out and about and the sleekness is to make the product unobstructive while worn.

II. Background (Sytle: Heading 1)

Menopause presents significant challenges for women aged 40+ due to the onset of symptoms starting as early as late their 30s to mid-40s with menopause's average age being 45-55 (Kaye, 2024). These symptoms vastly impact both physical and mental health. Symptoms include hot flushes, musculoskeletal and hormonal changes that may cause sleep disturbances and mood swings. These can severely disrupt daily routines and productivity [1]. Despite growing awareness, a noticeable gap remains in the market for accessible, effective systems to support menopausal women especially for those desiring non-hormonal solutions. This is heightened in urban regions due to the lifestyle-specific stressors like strained work-life balances which link to stress and further health problems [2]. Living in urban cities can also have an effect due to green space scarcity as a study showed that "women living in neighbourhoods with little green space became menopausal 1.4 years earlier than those in living" in greener areas [3].

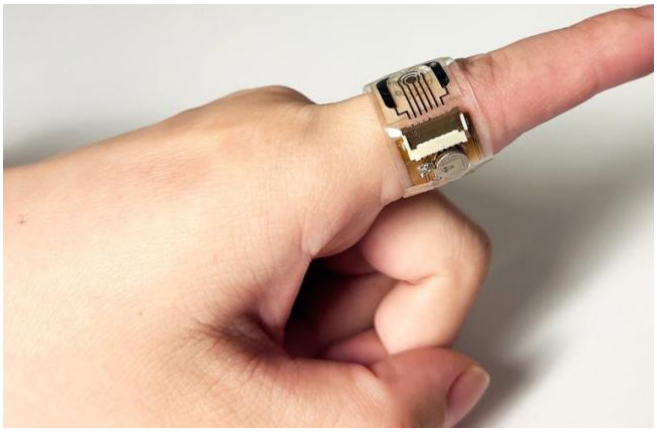
With the condition receiving little recognition in the healthcare and workplace for many years, the market remains underdeveloped with limited menopausal products available. This presents an opportunity for menopause dedicated products that address symptoms and empower the users with tailored information on their needs. With a rising acceptance towards health-consciousness, trends show how "middle-aged women are emerging as leaders in fitness, exercising more frequently than women in their 20s" [4]. As health-monitoring devices increase in popularity, and apprehension grows towards HRT due to the associated risks (cancer) [5], wearable technology presents itself as a tech-driven, natural alternative.

The noticeable scarcity of dedicated products tailored to address menopause mean smart wearables offer the potential to personalise symptom tracking and actionable, targeted interventions that focus on their wellness holistically. With the issues caused by employer restrictions, and inadequacies from the GP systems [6], having accessible digital health as a solution could help supplement the lack of support menopausal women face by providing the mandatory information on the condition while providing physical treatments in one place. Tapping into the growing trends of smart tech would have potential to create a meaningful difference in the lives of so many women as well as their loved ones as "38% of partners say they feel helpless when it comes to supporting their partner through the menopause." [7]

III. Related Work

Recent advances in wearable health technology have enabled new methods for non-invasive monitoring and symptom relief, which are particularly useful for managing menopause. Research into sweat-based bio-sensing has demonstrated the viability of detecting hormones such as cortisol and oestradiol using nano-engineered sensors and microfluidic patches [8], [9]. These innovations allow for real-time, discreet hormone monitoring increasingly feasible for consumer devices while being relatively small devices and non-invasive.

Wearable biosensor:



In terms of thermal relief, an existing product is the *Embr Wave which* uses thermoelectric cooling to manage hot flushes by delivering cooling and warming sessions. Clinical studies support the effectiveness of thermal adaptive technology in improving the user's comfort during menopausal temperature fluctuations [10]. This sets a precedent for using thermal tech in wearable wellness products.

While general health wearables like Fitbit and Apple Watch offer some tracking features, they are not tailored for menopausal users. Meanwhile, hormonal therapies raise health concerns, pushing demand for non-invasive alternatives [11]. Products like the *Ava Bracelet* and *Elvie Trainer* show the potential of combining smart tech with female-specific wellness needs, but few integrate both treatment and real-time monitoring in one device.

The Hera Band aims to bridge this gap, combining discreet thermal relief with hormone tracking in a sleek, wearable form.

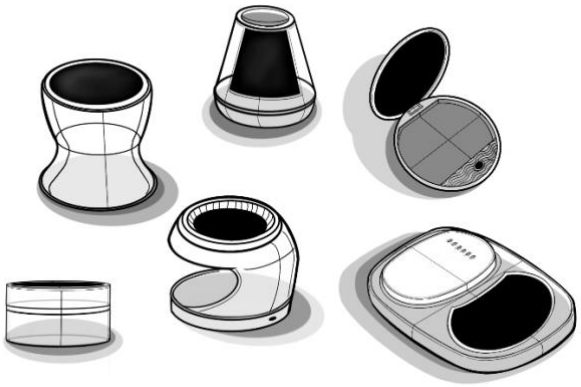
IV. Imagined or Existing Prototype Sketches/Drawings/Photos

A. Prototype Sketches

Below are some sketch iterations I did when developing a design that embodied a sleek and elegant yet organic form. As I worked on this project, I decided not to include an explicit screen similar to the traditional watch wearables as I didn't want to have another screen for the user to have to look at in addition to phones, and already existing small portable devices.

Initial Designs for the bracelet wearable:

Initial Designs for the Charging Dock:

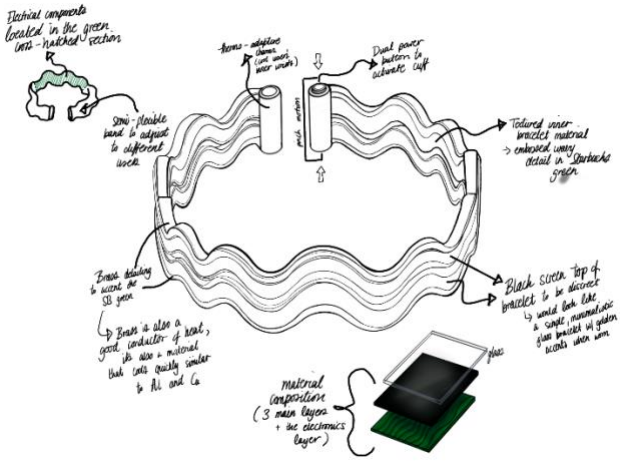


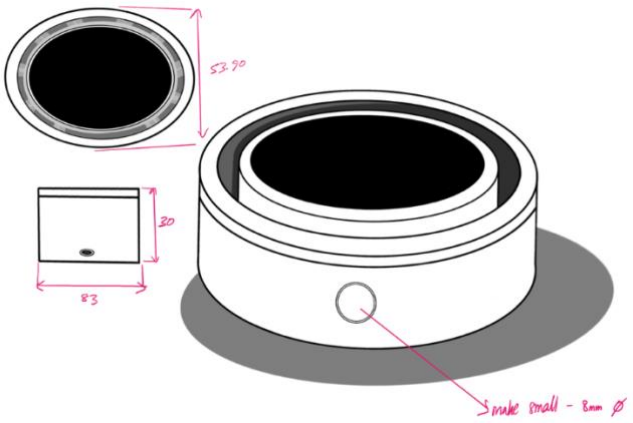
To combat the bracelet wearable's small size and minimisation of a screen, the design choice to make the charging station more central as a primary health hub expanded the role of the wireless charger. Doing this meant a charge dock could be where the users could interact with a larger screen located on the dock for the real-time data tracking, data insights and temperature personalisation in addition to a charging point.

B. Chosen Designs

This design felt quite elegant due to the wavy, organic lines that create a state of visual flow and therefore a calming effect – something which lends well to the idea of holistic wellness. The following sketches display the layers of the minimal screen and where the electrical components would sit within the bracelet. Brass was the proposed metal due to its properties as a good conductor and malleability for the complex shape. The thermal-adaptive components would be located on the inside of the wrist where the cylindrical bars due to optimal cooling. The wrists are a pulse point, "where blood vessels are close to the skin's surface," which means when these points are cooled they can help cool down the rest of the body by extension [12]. The location of the wrists also makes using the Hera band as a ice-pack alternative easy since the user can easily place their wrists on areas like the face, neck, and chest, all of which are typically affected.

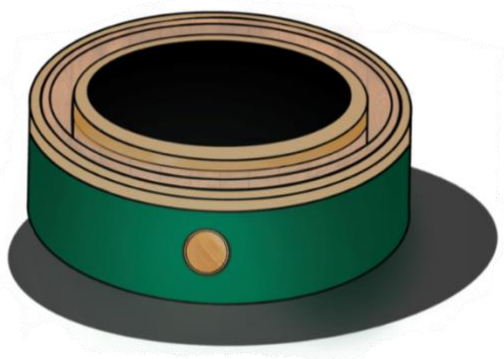
Initial Final Design with Annotations:





The dock is designed in a way that the cuff would be able to fit into the gap of the dock wrapped around the user interface.

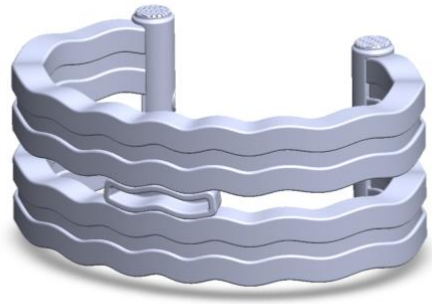
Proposed CMF hand-drawn renders:

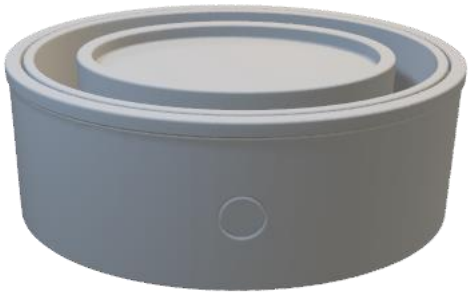


Materials chosen were wood, brass, glass for the UI screen and flexible polymer materials for the inner material of the bracelet where the sweat samples would be collected. The use of wood was to tie into an earlier point of how the lack of green spaces can negatively affect menopause [3]. Through use of natural materials and a calming green, this aims to take inspiration from natural elements outside which can be less present in urban environments.

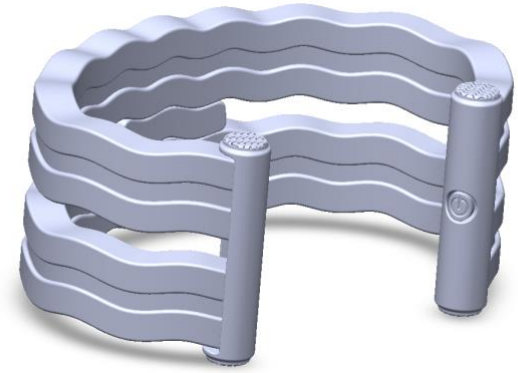
C. CAD Models

Both the CAD for the dock and bracelet were created on Solidworks.





Screenshot shows where the power button would be discreetly located.



Final Render of Hera Band:

V. RESPONSIBLE INNOVATION

For this project responsible innovation meant designing with empathy, long-term impact, and inclusivity in mind. Hera was developed to respond to the real gap in healthcare support for menopausal women, especially those looking for non-

hormonal, everyday solutions. With Hera, I wanted to create a product that feels stylish, empowering and accessible, as opposed to a clinical piece of technology thrown at the user.

For the environmental responsibility, I've tried to prioritise sustainability in both materials and user habits. The bracelet uses durable and recyclable components like brass, wood and flexible polymers, with a focus on longevity to reduce the need for frequent replacements. By centralising interaction through the dock rather than adding another screen to the wearable, Hera encourages mindful use and minimises unnecessary tech redundancy. I also aim for modularity in future iterations, so worn-out parts can be replaced without discarding the whole product to reduce waste at the end-cycle of the product.

VI. Author bio(s) / experiences

This project developed from a previous group project at university where I looked at encouraging holistic wellness through self-care practices for middle-aged adults in large metropolitan areas. As someone who studied chemistry before and has friends and family in bio-med, I became interested in the hormonal and physiology of adults as they age which led me into the topics of andropause and menopause. As a woman, I felt strongly about menopause considering the history of medical bias and invisibility surrounding women's health. Caroline Perez highlights this in her book "Invisible Women" where she demonstrates the gender-data gap in a system where men have been deemed a default for biological studies.

Talking with both older men and women alike, I was enlightened with stories about how they saw the struggles of menopause and the challenges of accommodating that while going about their daily activities i.e. work, going out, sleep, and etcetera. This has been an insightful and personal project that I hope is one of many examples to come of solutions for under-developed medical issues that women have to deal with.

VII. Acknowledgements

I would like to acknowledge my module leader / supervisor, Steve McGonigal for his helpful insight on my visual design development and extremely informative lectures which helped me shape and develop the direction for this project. I would also like to thank Dr Arthi Manohar for her help in looking at academic research that helped me to really delve into the feminist frameworks and medical literature to better understand the physical changes brought on by menopause.

VIII. References

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