



INTERNATIONAL EXHIBITION & SYMPOSIUM ON PRODUCTIVITY, INNOVATION, KNOWLEDGE & EDUCATION

“Optimizing Innovation in Knowledge, Education and Design”

EXTENDED ABSTRACT



e ISBN 978-967-2948-56-8



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© iSpike 2023 Extended Abstract is jointly published by the Universiti Teknologi MARA (UiTM) Cawangan Kedah and Penerbit UiTM (UiTM Press), Universiti Teknologi MARA (UiTM), Shah Alam, Selangor.

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eISBN 978-967-2948-56-8

Published by:
Universiti Teknologi MARA (UiTM) Cawangan Kedah,
Sungai Petani Campus,
08400 Merbok,
Kedah,
Malaysia.

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Assalamualaikum warahmatullahi wabarakatuh,



First and foremost, I would like to express my gratitude to the organizing committee of i-Spike 2023 for their tremendous efforts in bringing this online competition a reality. I must extend my congratulations to the committee for successfully delivering on their promise to make i-Spike 2023 a meaningful event for academics worldwide.

The theme for this event, 'Optimizing Innovation in Knowledge, Education, and Design,' is both timely and highly relevant in today's world, especially at the tertiary level. Innovation plays a central role in our daily lives, offering new solutions for products, processes, and services. By adopting a strategic approach to 'Optimizing Innovation in Knowledge, Education, and Design,' we have the potential to enhance support for learners and educators, while also expanding opportunities for learner engagement, interactivity, and access to education.

I am awed by the magnitude and multitude of participants in this competition. I am also confident that all the innovations presented have provided valuable insights into the significance of innovative and advanced teaching materials in promoting sustainable development for the betterment of teaching and learning. Hopefully, this will mark the beginning of a long series of i-Spike events in the future.

It is also my hope that you find i-Spike 2023 to be an excellent platform for learning, sharing, and collaboration. Once again, I want to thank all the committee members of i-Spike 2023 for their hard work in making this event a reality. I would also like to extend my congratulations to all the winners, and I hope that each of you will successfully achieve your intended goals through your participation in this competition.

Professor Dr. Roshima Haji Said
RECTOR
UiTM KEDAH BRANCH



WELCOME MESSAGE (i-SPIKE 2023 CHAIR)



We are looking forward to welcoming you to the 3rd International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023). Your presence here is a clear, crystal-clear testimony to the importance you place on the research and innovation arena. The theme of this year's Innovation is "*Optimizing Innovation in Knowledge, Education, & Design*". We believe that the presentations by the distinguished innovators will contribute immensely to a deeper understanding of the current issues in relation to the theme.

i-SPIKE 2023 offers a platform for nurturing the next generation of innovators and fostering cutting-edge innovations at the crossroads of collaboration, creativity, and enthusiasm. We enthusiastically welcome junior and young inventors from schools and universities, as well as local and foreign academicians and industry professionals, to showcase their innovative products and engage in knowledge sharing. All submissions have been rigorously evaluated by expert juries comprising professionals from both industry and academia.

On behalf of the conference organisers, I would like to extend our sincere thanks for your participation, and we hope you enjoy the event. A special note of appreciation goes out to all the committee members of i-SPIKE 2023; your dedication and hard work are greatly appreciated.

Dr. Junaida Ismail

Chair

3rd International Exhibition & Symposium Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023)

REED: 3D PRINTED WEARABLE DEVICE TO MANAGE ANXIETY THROUGH MELODIC MINDFULNESS

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ABSTRACT

Breathing is a powerful tool for managing anxiety. Reed, which is a two-inch stainless-steel device that looks like a harmonica. The purpose of this tool is to teach breath control to alleviate anxiety. While Reed may not eliminate the stresses of daily life, it can be used to lessen feelings of anxiety, calm the mind, and alleviate tension during particularly overwhelming moments. Reed aims to choreograph users with anxiety to how to do breathe during the anxious episode. Deep breaths can help to activate the ventral vagal branch of the nervous system, which promotes feelings of calm and relaxation. This wearable harmonica emits slow melodic sound to sooth the wearer and also guide the right breathing techniques to calm the nerves. By stimulating the vagus nerve, which connects the brain to the body's organs, slow breathing can help to regulate heart rate, blood pressure, and other physiological responses to stress.

Keywords: Anxiety, 3D Printing, Wearable Device, Harmonica, SDG 3

INTRODUCTION

A new scientific brief from the World Health Organization (WHO) indicates that during the first year of the COVID-19 pandemic, there was a significant increase of 25% in the global prevalence of anxiety and depression. Despite 90% of surveyed countries already including mental health and psychosocial support in their COVID-19 response plans, there are still significant gaps and concerns that need to be addressed. WHO Director-General, Dr. Tedros Adhanom Ghebreyesus, believes that this information only scratches the surface of the pandemic's impact on mental health, and he calls on all countries to prioritize mental health and provide better support for their populations (WHO,2022). Anxiety disorders affect a significant portion of the population. According to the National Institute of Mental Health (NIMH), an estimated 19.1% of U.S. adults had any anxiety disorder in the past year, and 31.1% experience any anxiety disorder at some time in their lives (Simmons, et al., 2021). Generalized Anxiety Disorder (GAD) affects 6.8 million adults or 3.1% of the U.S. population, with women being twice as likely to be affected as men. The Centres for Disease Control and Prevention (CDC) also reports on trends in anxiety and depression severity. While occasional anxiety is normal, anxiety disorders involve more than temporary worry or fear and can get worse over time.

THEORETICAL FRAMEWORK

There are several theoretical works that support the use of breathing techniques for anxiety management. One such work is the Polyvagal Theory, developed by Dr. Stephen Porges, which emphasizes the role of the autonomic nervous system in regulating our responses to stress. According to the Polyvagal Theory, the vagus nerve has two main branches: the sympathetic branch and the parasympathetic branch. The sympathetic branch is activated during the "fight or flight" response, while the parasympathetic branch is responsible for the "rest and digest" response. When we experience anxiety, our sympathetic nervous system is activated, which can lead to increased heart rate, shallow breathing, and muscle tension. However, by engaging the parasympathetic branch of the vagus nerve through deep,slow breathing, we can activate the body's relaxation response and reduce feelings of anxiety. Deep, slow breathing stimulates the vagus nerve, which in turn releases neurotransmitters such as acetylcholine and oxytocin that help to calm the body and mind. By taking slow, deepbreaths, we can slow down our heart rate, lower our blood pressure, and reduce muscle tension, all of which can help to alleviate symptoms of anxiety. In addition to promoting relaxation, deep, slow breathing can also help to improve cognitive function and emotional regulation by increasing the supply of oxygen to the brain and promoting a sense of mental clarity and focus. Overall, the Polyvagal Theory provides a framework for understanding howthe vagus nerve and deep, slow breathing can be used to manage anxiety and promote overall well-being.

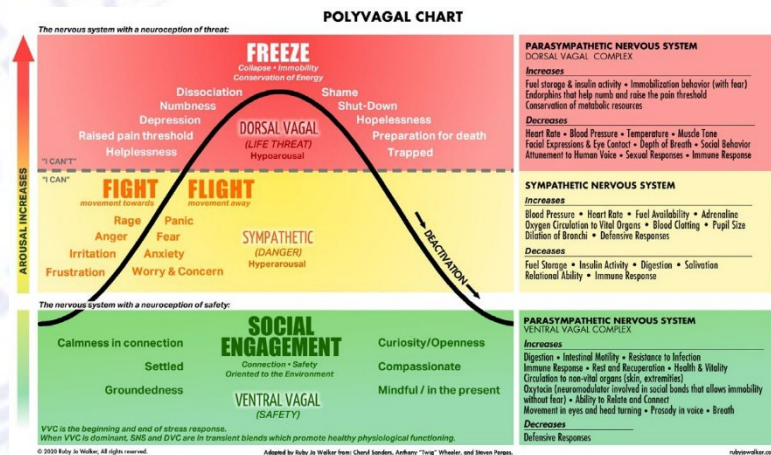


Figure 1. Polyvagal Chart. Retrieved from : <https://themovementparadigm.com/how-to-map-your-own-nervous-sytem-the-polyvagal-theory/>

DESCRIPTION OF INNOVATION: REED

Reed, a new 3D printed wearable device, will take the health and wellness world by storm. This mini harmonica is the brainchild of a team of researchers who have integrated the Polyvagal Theory and MBSR breathing techniques into its design. The goal is to provide a tool for managing anxiety and stress through the use of slow, deep breathing. What sets Reed apart is its unique light indicator at the top of the harmonica. This signals the intensity of the breath, with full brightness indicating the achievement of slow, deep breathing. The device is small and portable, making it an ideal companion for those on the go. This revolutionary two-inch stainless-steel device that resembles a harmonica, is designed to help those who suffer from anxiety by teaching breath control techniques. While it may not entirely eliminate life's stressors, Reed can aid in reducing feelings of anxiety, calming the mind, and alleviating tension during overwhelming moments. By guiding users on how to breathe during anxious episodes, Reed aims to facilitate a feeling of calmness through deep breaths, which can activate the ventral vagal branch of the nervous system. Through slow and melodic sounds, this wearable harmonica not only soothes the wearer but also teaches them the right breathing techniques to calm their nerves. The vagus nerve, which connects the brain to the body's organs, can be stimulated through slow breathing, thereby helping to regulate heart rate, blood pressure, and other physiological responses to stress. Furthermore, slow, deep breathing can shift the body out of a sympathetic state and into a more relaxed state, thus reducing feelings of anxiety and tension. Reed is designed to comply with Sustainable Development Goal 3, which aims to ensure good health and well-being for all. Specifically, in the context of anxiety, Reed can contribute to promoting mental health and reducing the prevalence and impact of anxiety disorders, aligning with the objectives of SDG 3. In a world where stress and anxiety are on the rise, Reed offers a simple yet effective solution for managing these conditions. By incorporating proven breathing techniques into its design, this wearable device has the potential to improve the lives of many.

BACKGROUND OF THE INNOVATION

Reed, the new 3D printed wearable device, aligns with the United Nations' Sustainable Development Goal (SDG) 3, which aims to ensure good health and well-being for all. By integrating the Polyvagal Theory techniques into its design, Reed provides a tool for managing anxiety and stress through the use of slow, deep breathing. This revolutionary two-inch stainless-steel device, which resembles a harmonica, is designed to help those who suffer from anxiety by teaching breath control techniques. The benefits of deep, slow breathing are well-documented, and Reed aims to make this practice more accessible and convenient for individuals on the go. The device's unique light indicator at the top of the harmonica signals the intensity of the breath, with full brightness indicating the achievement of slow, deep breathing. By guiding users on how to breathe during anxious episodes, Reed aims to facilitate a feeling of calmness through deep breaths, which can activate the ventral vagal branch of the nervous system. Reed's design addresses the mental wellness aspect of SDG 3, which aims to promote mental health and well-being. Mental health is a critical component of overall health and well-being, and it is essential to ensure that everyone has access to resources and tools to manage stress and anxiety effectively. By providing a tool like Reed, individuals can take control of their mental wellness and reduce the impact of anxiety and stress on their daily lives. In conclusion, Reed's design aligns with the SDG 3 goal of promoting good health and well-being by providing a tool that can aid in managing anxiety and stress. Its portable design and unique light indicator make it an accessible tool for individuals on the go. By encouraging deep, slow breathing, Reed aims to facilitate a sense of calmness and relaxation, which is essential for mental wellness.

DESIGN PROCESS

The design process for Reed, a wearable mini harmonica that aims to help manage anxiety through breath control, likely followed a series of steps to ensure its effectiveness and usability. Here is a possible overview of the design process:

1. Research and Conceptualization: The team of researchers would have conducted extensive research on anxiety management, breath control techniques, and wearable device design. They would have analysed existing solutions and identified gaps that could be filled by a new device. Based on their findings, the team would have developed a concept for Reed.
2. Prototyping: Once the concept was established, the team would have created several prototypes to test the design and functionality of Reed. This process would have involved multiple iterations of the design and feedback from potential users to refine the product.
3. Technical Development: After the prototype had been successfully tested, the team would have focused on the technical development of Reed. This would have involved selecting the appropriate materials, hardware components, and software development.
4. Production and Manufacturing: Once the technical aspects were finalized, the team would have moved on to producing and manufacturing Reed. This stage would have involved setting up supply chains, identifying manufacturing partners, and ensuring quality control.
5. Launch and Marketing: Once Reed is ready to go to market, the team will launch a marketing campaign to promote the product. This would have involved creating promotional materials, developing a pricing strategy, and identifying potential distribution channels.
6. User Feedback and Iteration: Once Reed is available in the market, the team will collect user feedback to identify areas of improvement. They would have used this feedback to inform future iterations of the design and continue to improve the product over time.

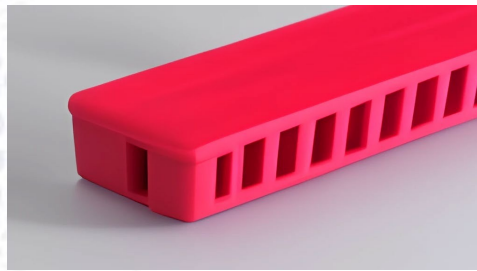


Figure 2: Reed, wearable 3D printed harmonica

IMPACT ON COMMUNITY

Reed is a remarkable innovation that has the potential to bring about a significant change in the community. Its design is carefully crafted to target anxiety and promote mental health, which are essential components of overall well-being. By providing a tool for managing anxiety through the use of slow, deep breathing, Reed can help individuals cope with daily stresses and alleviate tension during particularly overwhelming moments. This can contribute to reducing the prevalence and impact of anxiety disorders, which are a significant health concern worldwide. Moreover, Reed's small and portable design makes it an ideal companion for those on the go. It can be used at anytime, anywhere, providing individuals with a reliable and accessible tool to manage anxiety and promote well-being. This accessibility can have a positive impact on the community by empowering individuals to take control of their mental health and improve their quality of life (Adler, et al., 2019).

REED'S COMMERCIAL VALUE

Reed has the potential for significant commercial value as a wearable device designed to manage anxiety and stress through the use of slow, deep breathing. With the increasing awareness of the importance of mental health and the growing market for health and wellness products (Hickey, et al., 2021), Reed can appeal to a wide range of consumers, from those seeking relief from everyday stressors to those managing anxiety disorders. Reed's small and portable design makes it an ideal companion for those on the go, and its unique light indicator adds a visually appealing element to the device. As Reed gains popularity, it has the potential to become a must-have item in the health and wellness industry, leading to increased sales and revenue. Moreover, the technology used in Reed can also have applications in other fields beyond anxiety management, such as in breathing exercises for athletes or singers. This could open up opportunities for Reed to expand its market and increase its potential commercial value. The combination of a growing demand for mental health solutions and the unique design and functionality of Reed positions the device for significant commercial success.

Reed's potential commercial value is further amplified by the utilization of 3D printing technology in its production process. 3D printing technology allows for the rapid and cost-effective production of custom-designed products, enabling Reed to be manufactured efficiently and with high precision. This not only reduces production costs but also increases flexibility in the design process, allowing for modifications and improvements to be made

quickly and easily. Additionally, the use of 3D printing technology makes it possible for Reed to be personalized for each user, further enhancing its effectiveness in managing anxiety and stress. The combination of Reed's unique design, its focus on mental health and well-being, and the efficiency and flexibility provided by 3D printing technology make it a promising product with significant commercial potential in the health and wellness market.

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e ISBN 978-967-2948-56-8

