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Development of a low cost pendant-like wearable breast health monitoring device

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Abstract

Background

Breast cancer is the most common cancer among women worldwide and is a major public health concern in Bangladesh as well as other countries, where a lot of patients are diagnosed at advanced stages due to lack of awareness, delayed healthcare-seeking behavior, and limited access to screening facilities. Although a number of wearable breast-monitoring technologies have been developed in recent years, most of them rely on smartphones, internet connectivity, high-cost hardware, or specialized wearable garments, limiting their accessibility and acceptability. This project proposes the development of a low-cost, smartphone-independent wearable breast-health monitoring device designed to support early detection of suspicious physiological abnormalities of the breasts. The proposed device will be worn as a pendant-like accessory around the neck, positioning a compact circular sensing module in the intermammary region between the breasts. The device is designed to continuously monitor some selected physiological parameters, such as localized temperature fluctuations, tissue-related electrical changes, and vascular-related physiological alterations. When persistent abnormal physiological patterns are detected, the device will provide a simple vibration or audio

alert, encouraging users to seek professional medical evaluation.

Methods

The proposed device will be worn as a pendant like accessory around the neck, positioning a compact circular sensing modulant in the intermammary region between two breasts. The device is designed to continuously monitor some selected parameters such as localized temperature fluctuations, tissue related electrical changes, and vascularity related physiological alterations. When persistent abnormal physiological patterns are detected, the device will provide a simple vibration or audio alert, encouraging users to seek professional medical evaluation. The device will be developed using affordable but sophisticated commercially available sensors integrated with a low-power microcontroller and rechargeable battery system.

Results

The proposed device is not intended to diagnose breast cancer or replace already established diagnostic methods and tools like mammography, ultrasonography, magnetic resonance imaging (MRI), or physician examination. Rather it is designed as an early warning support tool that may improve breast health awareness, encourage timely medical consultation, and help to improve earlier detection pathways. If proven feasible, this device may bring a more culturally acceptable

approach to promoting breast health monitoring among women in Bangladesh as well as other low resource settings.

Conclusion

Unlike the CUSBr-patch of MIT, the proposed device will be able to collect data from larger area

of the breasts as the users can easily change the position of the sensor containing modulant by hand. AI will process the data and persistent changes will be evaluated.

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