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# Review on –Smart Bra Device for Detecting Breast Cancer Using Machine Learning

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**ABSTRACT:** Breast cancer is the most common malignancy in women worldwide including cancers in young patients. As compared to tumours arising in older patients, breast cancers in young women tend to be diagnosed at more advanced stages. Young age at breast cancer diagnosis has been historically considered a poor prognostic factor particularly in the case of breast cancers. Smart-Bra is used to detect the breast cancer at an earlier stage without using any scans like CT, MRI scans etc. In this smart-bra technology, we use temperature, lumps and blood flow sensors by using Arduino can detect breast cancer. Unlike mammograms, which use low energy X-rays, the Smart Bra uses sensors which does not produce any harmful radiation effect. Smart Bra is non-invasive and painless method comparing to mammogram screening. Doctor suggests mammogram screening for only women older than 50 years. Smart Bra is completely safe and comfortable for the women.

**KEYWORDS:** Smart Bra, Temperature Sensor,Lump detection, Machine Learning.

## I. INTRODUCTION

Breast cancer is one of the most common cancer in women and the second leading cause of women's cancer death. Despite the lack of effective treatment, the low accuracy of diagnosis is also a major cause of the high incidence and mortality of breast cancer. Mammography is a traditional method used for diagnosing breast cancer. Many cases such as doctor's negligence or incompetence in addition to a mammography error may also result in a late diagnosis or misdiagnosis, which can be considered a cause of breast cancer death. In the long term, early stage diagnosis could significantly increase the survival rate of breast cancer, therefore, it is important to improve the accuracy of breast cancer diagnosis. The main theme of our project is increasing survival rate by detecting breast cancer at an early stage. Lack of awareness also makes difficult for the treatment. Due to lack of awareness and late detection breast cancer is the most common cancer among women. Cancer in women always has a huge incidence rate and mortality rate. Breast cancer is considered one of the most common cancers in women caused by various clinical, lifestyle, social, and economic factors. Machine learning has the potential to predict breast cancer based on features hidden in data. As compared to tumours arising in older patients, breast cancers in young women tend to be diagnosed at more advanced stages. Young age at breast cancer diagnosis has been historically considered a poor prognostic factor particularly in the case of breast cancers. Today there are more than 1.15 million cases of breast cancer diagnosed worldwide annually. At present, only small numbers of accurate prognostic and predictive factors are used clinically for managing the patients with breast cancer. Early detection of this fatal disease is very important which helps in decreasing the mortality rate and increasing the survival period of breast cancer patients. Breast cancer has become the most recurrent type of health issue among women especially for women in middle age. Early detection of breast cancer can help women cure this disease and death rate can be reduced. Breast cancer alone is estimated to account for 25% of all new cancer diagnoses worldwide and 15% of cancer deaths in women worldwide, according to the latest cancer statistics. Every 1 in 8 Women in USA develop breast cancer in her lifetime. In case of any sign or symptom, people usually visit a doctor immediately, who may refer you to a doctor's for help. A doctor can diagnose breast cancer by: Examining the patient's medical history thoroughly, examining both breasts, and even checking for swelling or hardening of any lymph nodes in the armpits. Here in this project, we have to use the Smart Bra for detecting breast cancer and with the dataset we have used machine learning algorithms to predict whether a patient has breast cancer or not. Smart Bra brings awareness to the women about the early signs and diagnosis of the disease. Mammogram screening is not possible for women above 40 can undertake the screening. Smart Bra is extremely cheap compared to mammogram.



## II. LITERATURE SURVEY

The research papers help us to find the existing models and guide us to develop a new thesis by overcoming the problems which have been found out

Badawy, Samir M Hefnawy, Alaa A Zidan, Hassan E [1] proposed “Breast cancer detection using mammogram segmentation” tells that mammography is specialized medical imaging for scanning the breasts. A Mammogram helps in the early detection and diagnosis of breast cancer. Mammogram image segmentation is useful in detecting the breast cancer regions, hence, better diagnosis. In this paper, they applied enhanced double thresholding-based approach for Mammograms image segmentation.

Priyanka, Kumar Sanjeev [2] proposed “Breast cancer detection using deep learning” states that deep learning is a sub-field of the machine learning. Deep is an unsupervised learning that learns from the data. For the classification of the breast cancer dataset, Convolution Neural Network is used. Convolutional Neural Network is used to classify the images. It takes the images of the breast cancer dataset as an input. CNN takes the images as an input associated with their corresponding weights.

Maged A Aldhaeabi, KhawlaAlzoubi [3] proposed “Microwave imaging for Breast cancer detection” microwave-based detection techniques offer several advantages over other detection methods such as being inexpensive, non-invasive, non-ionizing, and a comfortable form of treatment. In addition, MI techniques provide higher sensitivity and the ability to detect small breast tumours as these techniques are based on the contrast of electrical properties between normal and tumorous breast tissues. Such detection techniques are based on the hypothesis that the electrical properties, namely the permittivity and conductivity of malignant breast tissues, differ from those of healthy breast tissues within the microwave band. In literature, there are three modalities that have been explored for microwave-based breast detection.

Rongrong Guo, Baowei Fei [4] proposed “Ultrasound Imaging Technologies for Breast Cancer Detection and Management” ultrasound imaging is a commonly used modality for breast cancer detection and diagnosis. In this review, we summarize ultrasound imaging technologies and their clinical applications for the management of breast cancer patients.

Murat Karabatak [5] proposed A new classifier for “Breast cancer detection based on Naïve Bayesian” In this paper, a new naives bayes classifier was proposed and its application on breast cancer detection was presented. Several experiments were conducted to evaluate the performance of the weighted naives bayes on the breast cancer database.

Y.Ireaneus Anna Rejani, S.ThamaraiSelvi [6] proposed “Early Detection of Breast Cancer using SVM Classifier Technique” This paper presents a tumour detection algorithm from mammogram. The proposed system focuses on the solution of two problems. One is how to detect tumours as suspicious regions with a very weak contrast to their background and another is how to extract features which categorize tumour.

Prof. Monica Morrow [7] proposed “MRI for breast cancer screening, diagnosis, and treatment” MRI is used widely both for screening women who are at increased risk of breast cancer and for treatment selection. Prospective studies confirm that MRI screening of women with known or suspected genetic mutation results in a higher sensitivity for cancer detection than does mammography. However, survival data are not available. In women with breast cancer, MRI detects cancer not identified with other types of screening.

Mehedi Masud, M Shamim [8] proposed “Pre-Trained Convolutional Neural Networks for Breast Cancer Detection Using Ultrasound Images” This study implements pre-trained convolutional neural network based models for detecting breast cancer using ultrasound images. In particular, we tuned the pre-trained models for extracting key features from ultrasound images and included a classifier on the top layer.

Sebastien Jean [9] proposed “Breast Cancer Detection Using Infrared Thermal Imaging and a Deep Learning Model” Our review of the literature first explored infrared digital imaging, which assumes that a basic thermal comparison between a healthy breast and a breast with cancer always shows an increase in thermal activity in the precancerous tissues and the areas surrounding developing breast cancer.

## III. REVIEW FINDINGS

[1] Mammography is the only approved exam to be used for screening breast cancer in women with no prior symptoms. Mammography, however, has recently been subjected to immense security because of relatively high false negative and false positive results that can prove to be emotionally disruptive to the patient’s life. Furthermore, women who use mammography as a screening test have a higher chance of developing cancer because of the ionizing radiation associated with X-rays. Physical discomfort to women undergoing mammography is another drawback of this imaging





technique. Mammogram is a risk process and releases harmful radiations that affects the body. Doctors suggest that mammogram is only suggested for the particular age group.

[2] Ultrasound technique which was used for breast cancer detection is not advantageous for breast imaging as it exhibits low resolution due to it not being able to distinguish between malignant and benign breast tumours.

[3] MRI is highly sensitive in detecting invasive and small abnormalities compared with mammography and ultrasound techniques and can be used effectively for patients with dense breasts. Testing using MRI, however, is relatively expensive. Additionally, in MRI, inadequate breast positioning can cause unsuccessful detection. Existing Systems uses MRI scans it affects the body. This also became an disadvantage for existing system.

[4] Breast examination which we use for breast cancer detection is a time consuming process. If the detection is time consuming then the person may get severely affected by breast cancer.

#### IV.PROPOSED WORK WITH METHODOLOGY

Smart Bra is our proposed system which can be used for detection of breast cancer at an early stage. The life-sharing bra has sensors like temperature, lumps and blood flow sensor. Temperature sensor is used as the cancer cells have a high metabolic rate, and so, have a higher temperature than normal cells. If there is an abnormality it shows up a temperature difference. The bra is worn for 15 to 20 minutes. This bra is completely safe and also convenient method comparing to mammogram. Health care professional can easily carry them easily in their bags during field visits hence it is portable device. We came up with the solution of Smart Bra which is an intelligent device is used to detect the breast cancer at an early stage of life. Smart Bra Produces the result to the phone or tablet by giving guidance to the women to consult doctors. By which many women detect breast cancer at an early stage. The smart bra uses temperature sensors for detecting temperature specifically in the breasts. Our model predicted the possibility of differentiation of cancerous breasts from healthy breasts by significantly different skin temperature variation. In proposed system we came up with the new solution which the Smart Bra includes Temperature sensors and through symptoms. This Smart Bra is applicable to any age group whereas in existing systems it is not like that. It is applicable to particular age group. This is one of the biggest advantage in our proposed system.

The methodology involves for detecting breast cancer is as follows:

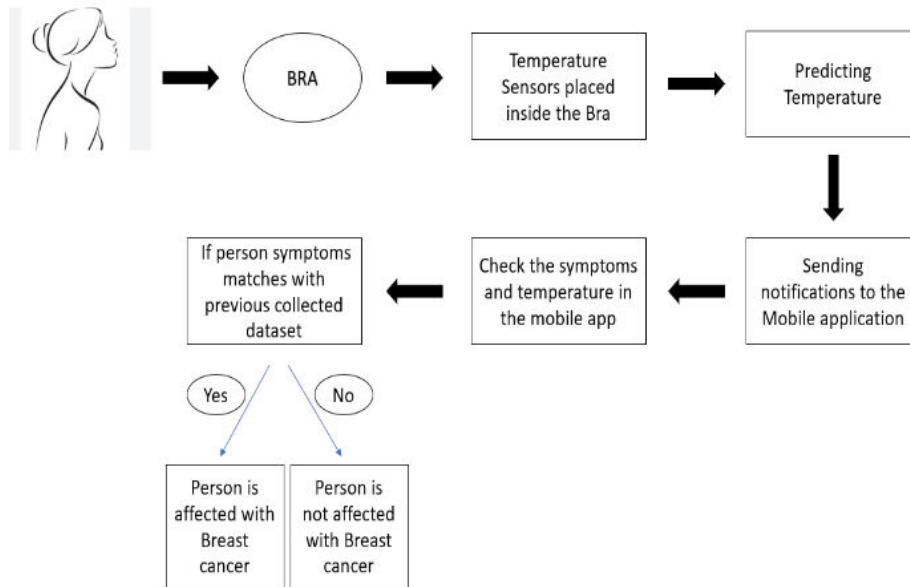
- Take the Smart Bra.
- Place the temperature sensor inside the Bra.
- Predicting the temperature.
- Sending notification to the mobile application.
- Check the symptoms and temperature in the mobile application.
- If the temperature and symptoms will match then it displays that the person is affected with Breast cancer.

Process taking place for detection of breast cancer is as follows:

- Inside the smart bra we are placing a temperature sensor.
- After placing the temperature sensor, it predicts the temperature.
- If temperature is too high or too low, then it sends the notification to the mobile application named as MIT APP INVENTOR.
- These sensors produces the results accurately. In that application, we have to select the symptoms of a person.
- Previously we collected the data sets which consists of symptoms of breast cancer.



- If person symptoms are matches with datasets then we conclude that the person is having breast cancer.



### V. COMPARISON WITH EXISTING SYSTEM

The existing system is entirely based on Mammogram, Breast ultra sound, MRI, Breast examination. The existing system has many disadvantages for detection of breast cancer. Mainly mammogram is the risk process and costly method for detecting breast cancer and releases the harmful radiations that affects the body at all. Doctors also suggested that mammograms is not supported for all age groups. Ultrasound technique which was used for breast cancer detection is not advantageous for breast imaging as it exhibits low resolution. Many cancers are not visible in Breast Ultrasound.

MRI is highly sensitive in detecting invasive and small abnormalities compared with mammography and ultrasound techniques and can be used effectively for patients with dense breasts. Testing using MRI, however, is relatively expensive. Additionally, in MRI, inadequate breast positioning can cause unsuccessful detection. Existing Systems uses MRI scans it affects the body. Breast examination which we use for breast cancer detection is a timeconsuming process.

So we came up with the new proposed technique called as a device Smart Bra. It is used for detecting breast cancer at an early stage. This will helps to a woman for early recovery as early as possible. Smart Bra doesn't release any harmful radiations and it doesn't affects the body at all. And our proposed technique has many advantages than compared to existing systems. When comparing with existing systems our proposed technique provides many advantages like reduction of cost, feeling comfort, Gives privacy, No release of harmful radiations and also increases the survival rate for detecting breast cancer.

#### ADVANTAGES

- Smart Bra doesn't release any harmful radiations in to the body.
  - Smart Bra is used to detect breast cancer at an early stage.
  - Reduces the cost compared with other techniques for detection of breast cancer.
  - Increases survival rate.
  - Gives privacy
- Smart Bra also addresses privacy concerns one can wear clothes over it during the test. Even young girls can wear it of age 15 or 20 years can use wearable device.



## VI.CONCLUSION

The main theme of our project is increasing survival rate by detecting breast cancer at an early stage by using a Smart Bra. Mostly in breast cancer imaging techniques, microwave sensors and other imaging techniques like deep learning, machine learning are widely used. But in this paper we suggested a new technique which provides better identification on lumps and cancerous tissue. For Analysing the breast cancer Temperature Sensor have been used. And finally visualization of breast will be processed as alert message to mobile phone. Future scope for this project will be effective than previous method, like graphical representation to analyse the depth and stage of the tumour.

## REFERENCES

- [1] Bilal Majeed, Hafiz Talha Iqbal, Uzair Khan and Muhammad Awais Bin Altaf, A Portable Thermogram based Non-contact Non-invasive Early Breast-Cancer Screening Device, IEEE 2018.
- [2] Robyn B. Broach, RulaGeha, Brian S. Englander, Lucy dela- Cruz, Holly Thrash and Ari D. Brooks, A cost-effective handheld breast scanner for use in low-resource environments a validation study, World Journal of Surgical Oncology (2016).
- [3] RossanoGirrometti& Martina Zanotel& Viviana Londero& Anna Linda & Michele Lorenzon& Chiara Zuiani, "Automated breast volume scanner in assessing breast cancer size. A comparison with conventional ultrasound and magnetic resonance imaging", European Society of Radiology 2017.
- [4] Lulu Wang, Microwave Sensors for Breast Cancer Detection, Sensors, 2018.
- [5] J Malone S Sngwon, MA Adams, Breast cancer screening and cancer among black sexual minority women: A scoping review of the literature from 1990-2017, Journal of women's 2019-Liebertpub.com.
- [6] Khuda IE. A comprehensive review on design and development of human breast phantoms for ultra-wide band breast cancer imaging systems Engineering Journal 2017.
- [7] Megha Rathi, Vikas Pareek, "Hybrid approach to predict breast cancer using machine learning techniques," International Journal of Computer Science Engineering, vol. 5, no. 3, pp. 125- 2016.
- [8] M. Tahmooresi, A. Afshar, B. Bashari Rad, K. B. Nowshath, M. A. Bamiah," Early Detection of breast cancer using machine learning techniques,"Journal of Telecommunication, Electronic and Computer Engineering, vol. 10, no. 3-2, pp. 21-27, 2018.
- [9] MuhammetFatih Aslam, YunusCelik, KadirSabanci, AkifDurdu, "Breast cancer diagnosis by different machine learning method using blood analysis data," International Journal of Intelligent System and Applications in Engineering, vol. 6, no. 4, pp. 289-293, 2018.
- [10] Anusha bharat, Pooja N, R Anishka Reddy, "Using machine learning algorithms for breast Cancer risk prediction and diagnosis," IEEE 3rd International Conference on Circuits, Control, Communication and Computing, pp. 1-4, 2018.
- [11] Ebru Aydindag Bayrak, Pinar Kirci, TolgaEnsari, "Comparison of machine learning methods for breast cancer diagnosis.2019 Scientific Meeting on Electrical-Electronics & Biomedical Engineering and Computer Science (EBBT), pp. 1-3,2019.
- [12] Shwetha K, Spoorthi M, Sindhu S S, Chaithra D, "Breast cancer detection using deep learning technique," International Journal of Engineering Research & Technology, vol. 6, no. 13, pp.1-4, 2018.





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