SHOCHETON(CAUTION) APP: AN AI BASED WOMEN REPRODUCTIVE HEALTH TRACKING APP

Submitted by

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Level 3 Term 1

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Github repository link:

https://github.com/tasnimislam/shocheton_app_final

Shocheton

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Abstract

Women reproduction health is one of the most valuable thing that needs regular care. But the social stigma in underdeveloped and developing countries like ours, Bangladesh, there is a trend women not taking care of their reproductive health, that includes keeping track of their periods, breast self assessment or any other physical conditions which can result to even breast cancer or cervical cancer that cause untimely death to many women. But this is totally curable by taking care of, keeping regular track. In this project we are integrating neural network in the backend, cloud connectivity is assured to the doctors and hospitals, they can be notified about the women health. Also multiple assessment method will ensure the accuracy of the AI predictions. As AI can not supersede the power of medicals, the app provides direct contacting opportunity with the doctors'. The notification system also notify other family members of the particular woman, in hope of breaking the social stigma and create awareness.

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Objectives

AI based breast cancer detection

Regular Health updates

Health updates in cloud

Home service reliability

Awareness among the family members

Alarming conditions informed to the family

Concern authorities should be notified to help the patients

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Background

WOMEN REPRODUCTIVE HEALTH SCENARIO

Bangladesh, burdened with a huge population, is facing a severe shortage of human resources for health facilities having approximately five physicians and two nurses available for every 10,000 people. Healthy women are vital for healthy families and communities. . However, women's problems generally get a lower priority in Bangladeshi society where reproductive healthcare in always ignored due to religious and social superstition.

Like all other south Asian's Country a significant number of the breast cancer cases identified each year. To battle against breast cancer in resource-limited countries like Bangladesh, it is not feasible to set up a parallel health service system solely dedicated to cancer. Therefore, a cost-effective public health strategy is needed which could reach a large number of women in the country. Considering all these issues, an innovative female based primary healthcare approach focused on awareness, screening and early detection of breast cancer in Bangladesh Breast cancer generally occurs because of hormonal disorder or abnormal breast tissue growth or genetically reasons. Considering these facts, women need a regular Monitoring of their reproductive health, that includes –

- Keeping period tracks
- Self-assessment of breast
- Weight tracking
- Awareness against reproductive organ

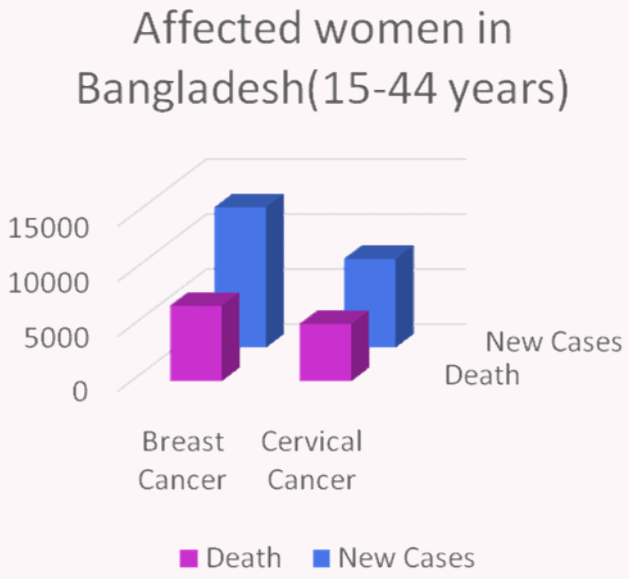

Figure 1: Statistic by WHO(Globocan, 2018)

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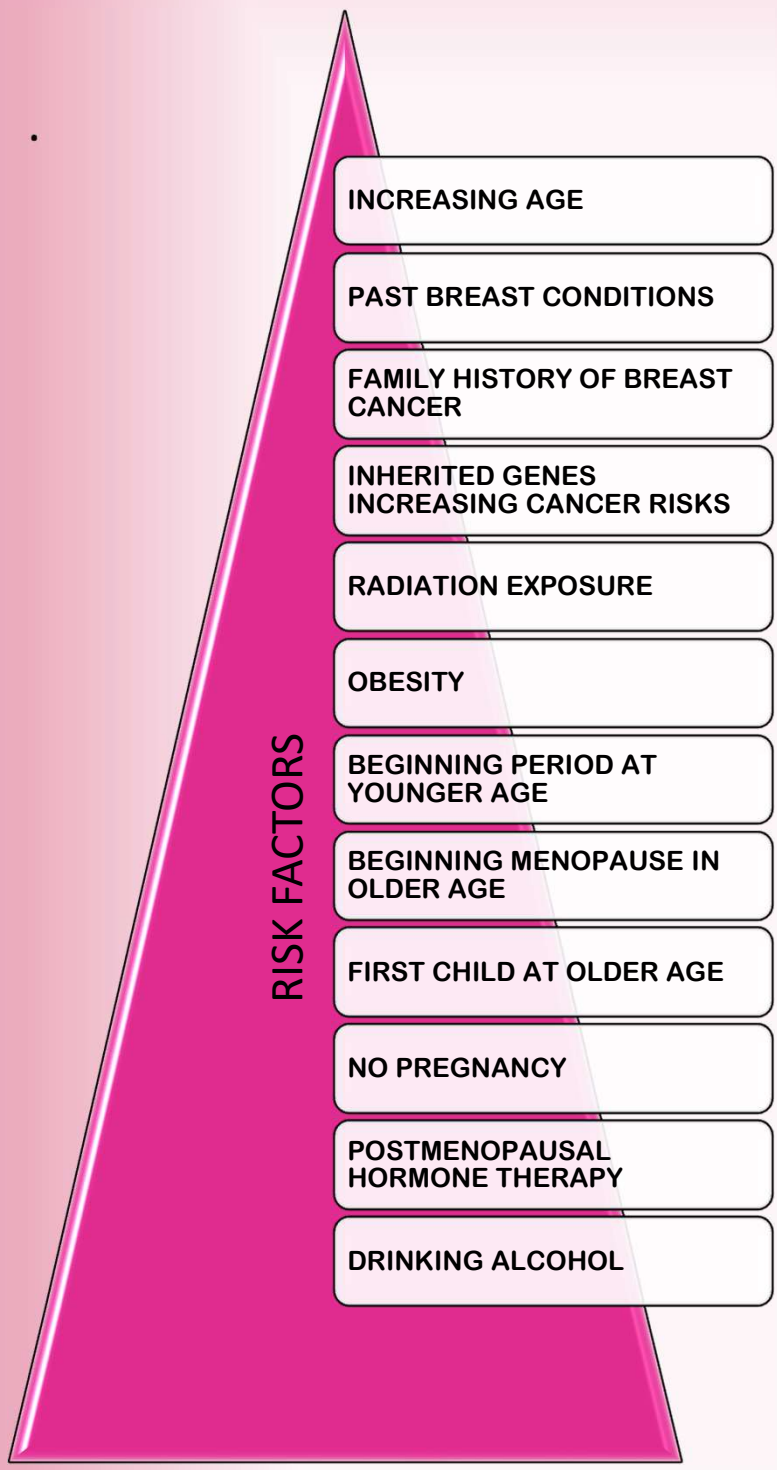
Background

Lack of cautiousness regarding these factors can cause breast cancer and cervical cancer which causes untimely death. Some of the risk factors causing such cancers are discussed below -



Despite of these risk factors, almost 5-10% cases are exceptional. Regular assessment is the key to make sure that there is no risk and if breast cancer is diagnosed in the primary stage, it is 100% curable, but in 3rd or 4th stage the treatment is both risky and expensive and the survival rate is quite low

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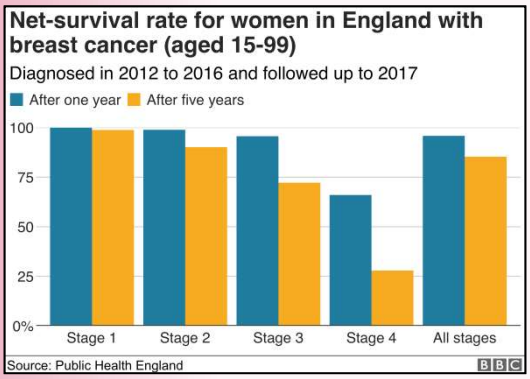
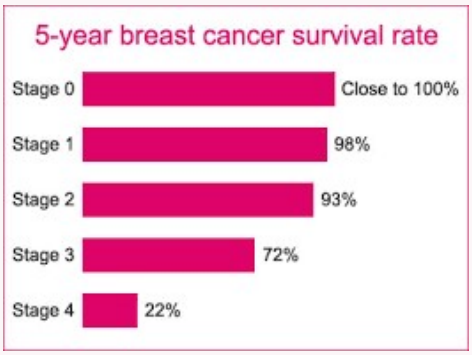
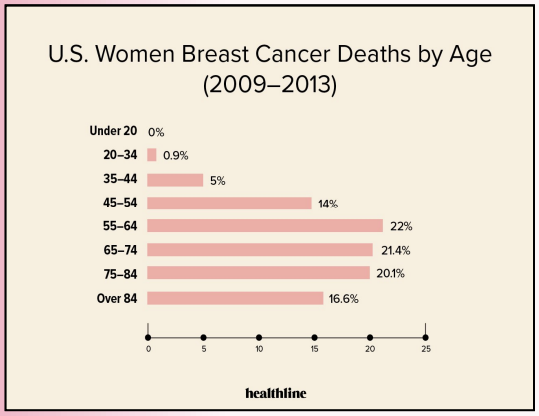
Background

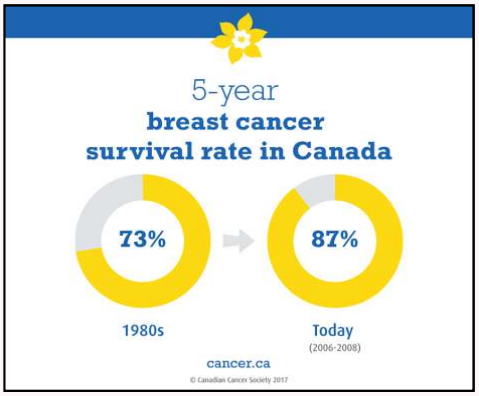
BREAST CANCER SCENARIO THROUGHOUT THE WORLD

Breast cancer remains a leading dreadful cancer of women in Bangladesh. It has become a hidden burden which accounts 69% death of women. . Different research shows that's survival rate at breast cancer is almost close to 100% if it is diagnosis at very early stage and at stage it also depends upon age. Undoubtly early detection is prime and prior criteria regarding this matter.









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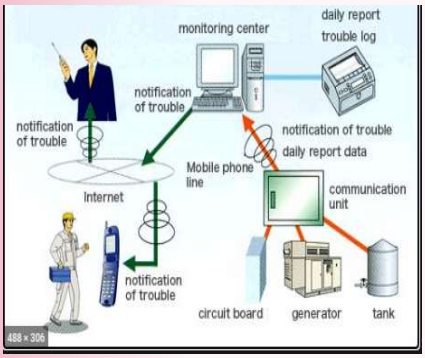
Impact

This App is designed on the basis of **Routine health information systems** (RHIS) which comprise of data collected at regular intervals at public, private, and community-level **health** facilities and institutions and **health** programs regarding reproductive health care. The collected data give a picture of **health** status, **health** services, and **health** resources . RIHS mean that patients have started to entrust their health data to mindless machines, or the reason is hiding in medical institutions' that aim at cutting the expenses and reducing the attendance at medical facilities

- ✓ Remote Monitoring
- ✓ Monthly Diagnosis at home
- ✓ Data synced in cloud
- ✓ Low Cost
- ✓ Notification for treatment



R emote Monitoring in Real Time: The main benefit of this App is its remote patient monitoring or homecare telehealth. It allows every female to use a mobile medical device to entry **Routine health information** after doing **breast self-exam** to Upazila health complexes (UHC). Currently, 271 upazila health complexes (UHC) have established Clinical breast examination (CBE) centers in all districts of Bangladesh and the current training is equipping senior staff nurses from 14 additional UHCs located in 7 districts to conduct screening.

R elatively Lower Cost: With home telehealth, it is not necessary to go to a clinic for prescription or ask your physician about tests results. The app is ensuring home ultrasound facility and multi assessment methods at home, which is low cost and handy.

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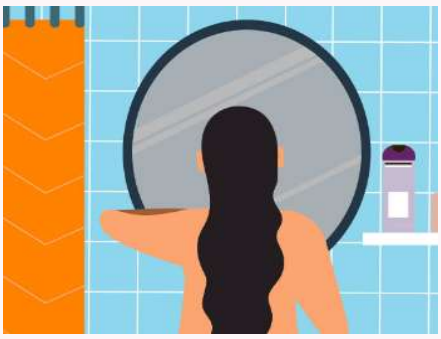
Impact

Safe and User friendly: This App has active and passive monitoring unit, it is completely safe for every women in a family. The design of this app has been done considering the user friendly aspect both for teenagers and elderly women. Here teenagers can help the elderly member of the family. This RIHS is very effective for the women at age 50+. Because the affected rate is higher at that age.

Frequent Diagnosis at Home:

Homecare telehealth enables easy and quick communication between physicians and. Doctors can counsel the patients online with no need to wait for the appointment date. With RIHS from home with convenience and comfort. The RIHS monitoring team is also able to inform patients about if any critical deterioration occur.



Data Record History: Through central server data processing, unit App allows doctors to reach out to potential patients. The monitored data are preserved in a data 37 base with time and date for future references and if the analysis has some vital abnormality it notifies the patients and has emergency provision of contacting a doctor or upazila health complexes (UHC)

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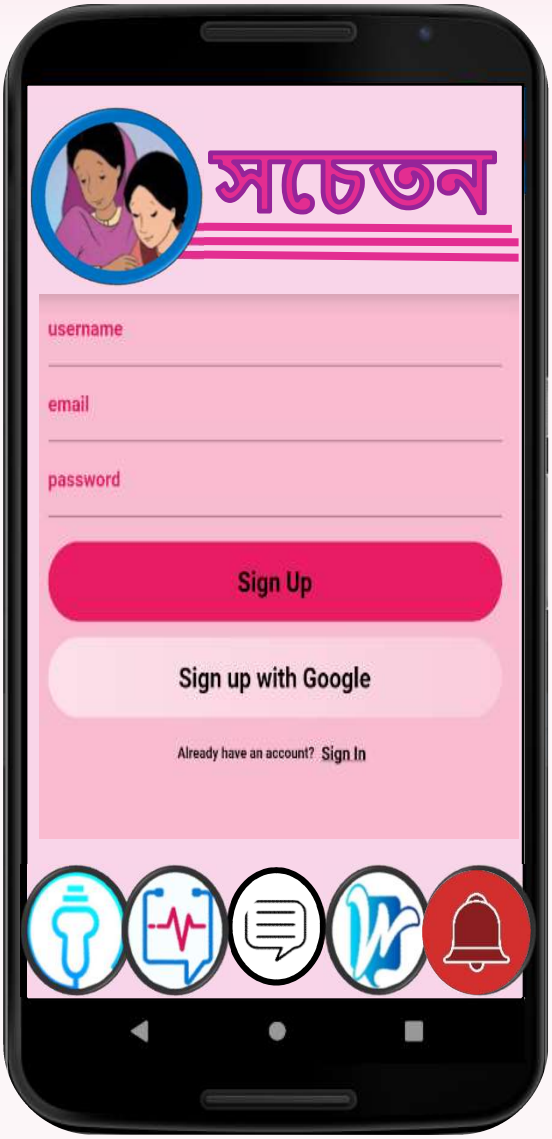
Conceptual Framework

SIGN IN/UP

To maintain the privacy the app provides separate login with id and secured password, also cloud is also integrated, so one account can provide all the facilities



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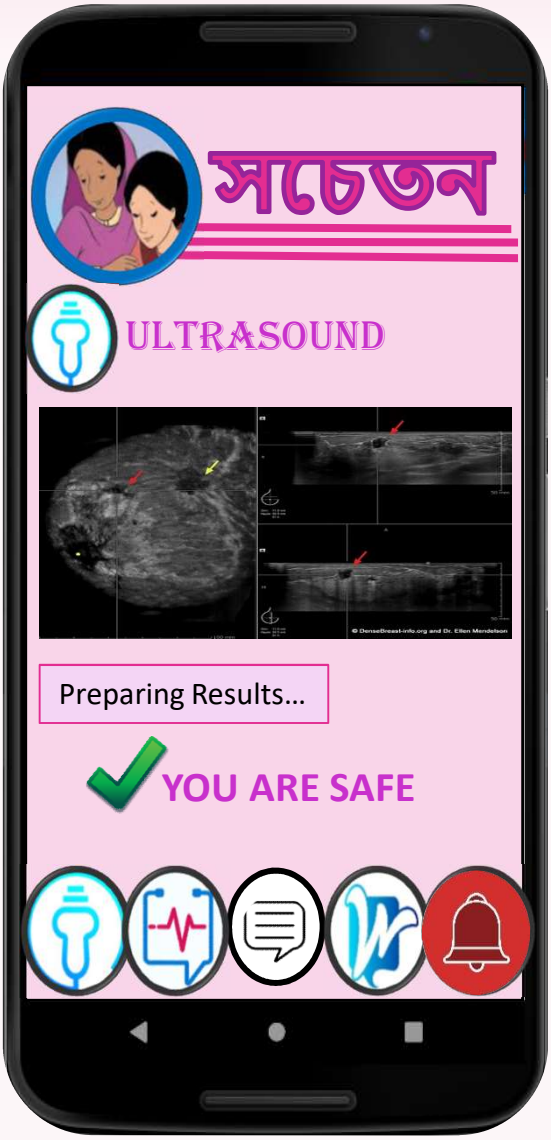
Conceptual Framework

ULTRASOUND

The app is able to scan the ultrasound results from home and give the prediction if the person is safe from breast cancer or not. The mobile device will be connected with mobile ultrasound device(which is very handy and low cost). Then the scanned image is transferred to the app and then sent to the cloud. Then in the cloud there is a artificial neural network which is trained to do diagnosis if the ultrasound is safe from breast cancer or not. The results comes to the app and synced to the monthly updates of the cloud.



Send Data for prediction
Neural network
integrated in backend

Send Prediction

Conceptual Framework

MESSAGE

The messaging part of the app will be connected to the doctors and nearby hospitals, where women can find the people's contact information and they can message them and talk with them in the fastest time. This will save the time for going outdoors and clear out their thoughts

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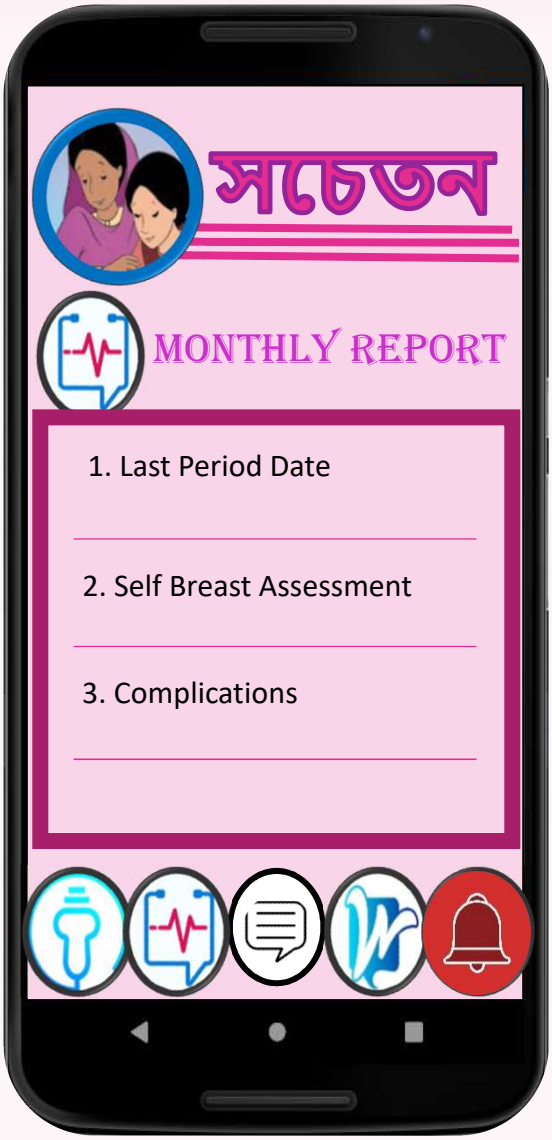
Conceptual Framework

MONTHLY REPORT

Here women will update their monthly reports on necessary parameters of health. The points include -

1. Last period date
2. Period duration
3. Abnormalities in period
4. Weight
5. Self assessment report of breast
    a) Lumps
    b) Unusual texture
    c) Pain
    d) Abnormality in size
    e) Abnormal secretion from breast nipple
6. Pregnancy updates(if applicable)
7. Menopause updates(if applicable)



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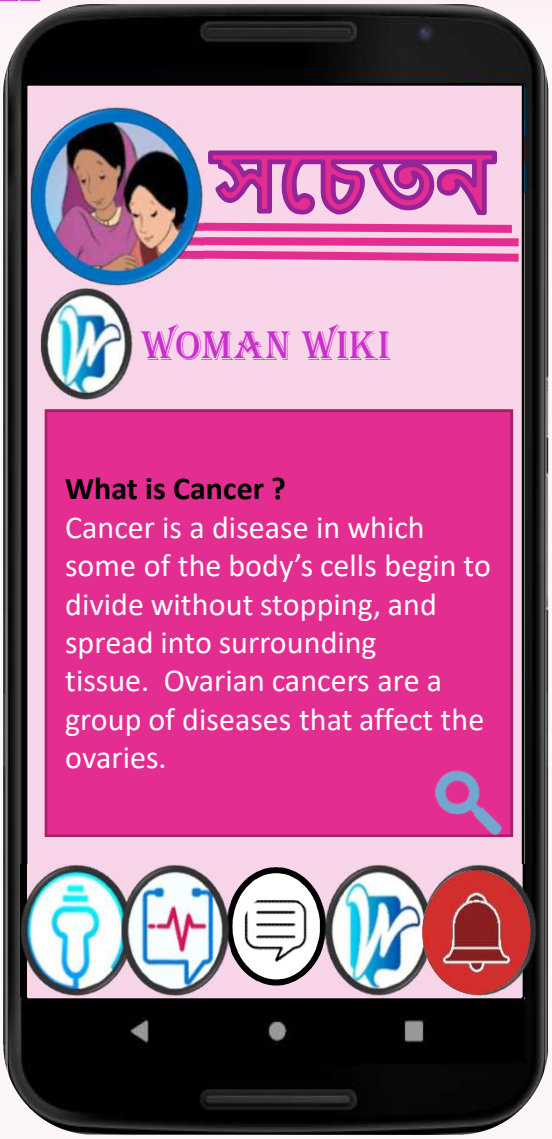
Conceptual Framework

WOMAN WIKI

Here women can know about different facts about women health and necessary information for how and why they should take care of themselves, Also search is provided so that easily they can search the facts and learn about them



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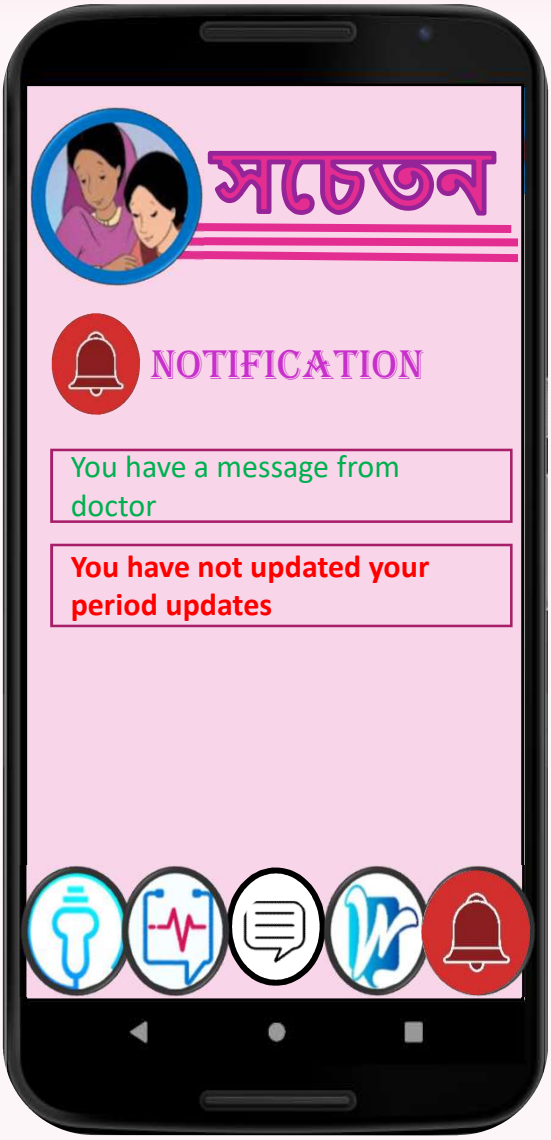
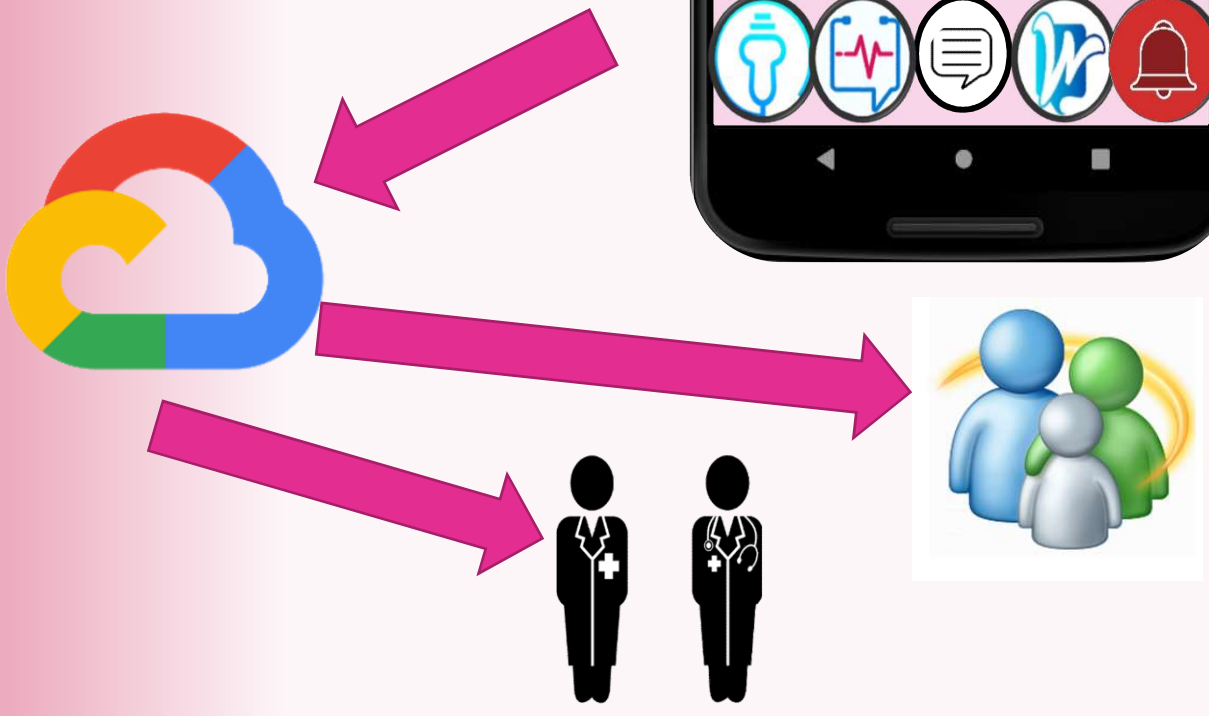
Conceptual Framework

NOTIFICATION

This is a special feature of this app, if the particular user has not updated any information, also the notification will be also provided to her family members and the hospitals, so that they can warn her and take care if necessary. So the notification service is cloud connected with multiple users.





Self assesment

Prevention of breast cancer

Watch keenly at least once a month for any change in your breast. Look at their shape, size, consistency, similarity. Several may cause these changes. Cancer is one of them. In early stage of cancer, these changes may appear.

Regular changes:

Usually, the secretory glands of the breast become active prior to starting of the regular monthly periods.Breasts may be heavy, slightly painful at this time. Some ladies may experience a lump in the axilla. These changes become more frequent in the premenopausal age.

Ladies having hysterectomy may experience these changes in every month. Breasts The best time to examine the breast is just after the end of the monthly cycles.

At the menopausal stage, breasts should be examined at the same manner, at the same intervals.

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Selfassesment

How will you examine?

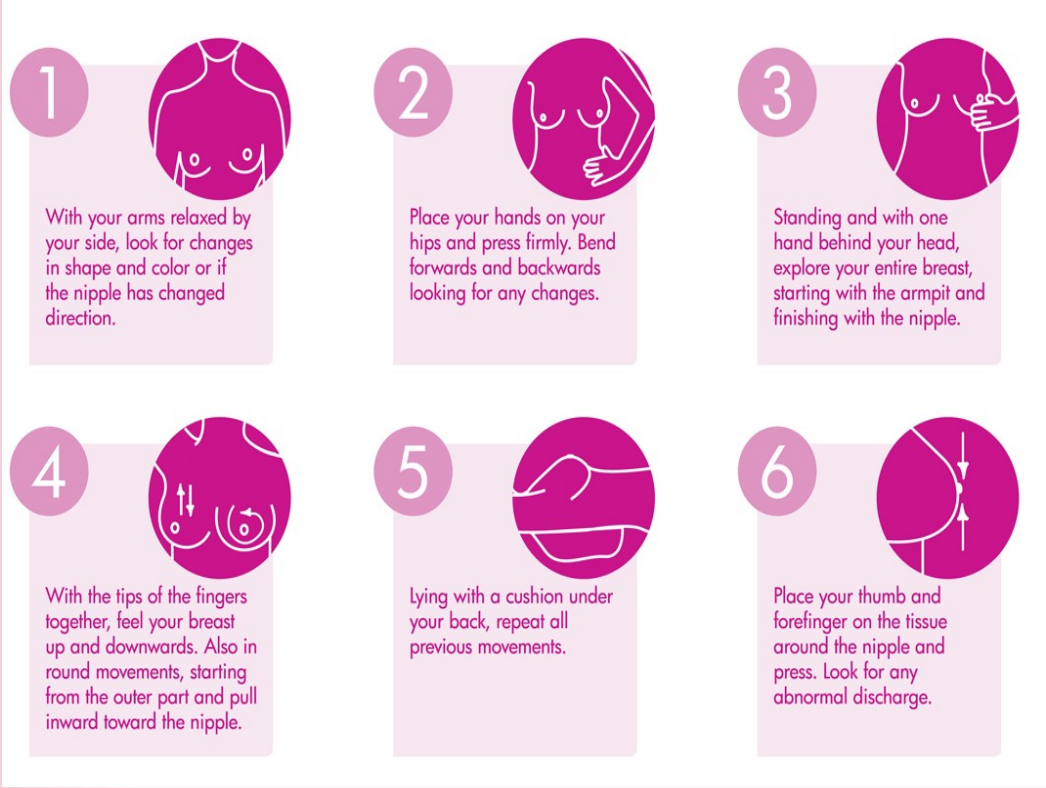
Stand straight in front of a mirror. Remove any clothing from your breasts. Look for any unequal size. Sizes may be dissimilar normally.

Lean forward, bend your waist a little, move side to side. Look whether they are moving equally. Support them from below. Look for any dimple, or puckering in the overlying skin.

Another point to be noted that the nipples are normal looking or not. Any inversion of the nipples is significant.

Now, raise the hands together above your head. This time, again look for any dissimilarity in shape or size.

If you discover any of the above changes, seek advise from specialist doctor.



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Feeling

If you feel pain, a painful nodule, if size and shape of your breasts are challenging and becoming dissimilar.
If you notice any discharge from the nipples. If the nipples are changing in appearance.
If feel any skin puckering on movement of the breast.
Disclose all the details of the changes you have discovered. Speak about the duration and rate of progress of the changes to your doctor. The doctor has better idea about what to do. Till few years back, periodic mammography was recommended fir every woman after forty. Now a days, ultrasound is more efficient to detect early changes.
Remember, do not hesitate to express your problems to your doctor. If you are sincere, your consciousness can help early detection of breast cancer. Treatment at early stage is not that difficult. Your doctor is always eager to help you.

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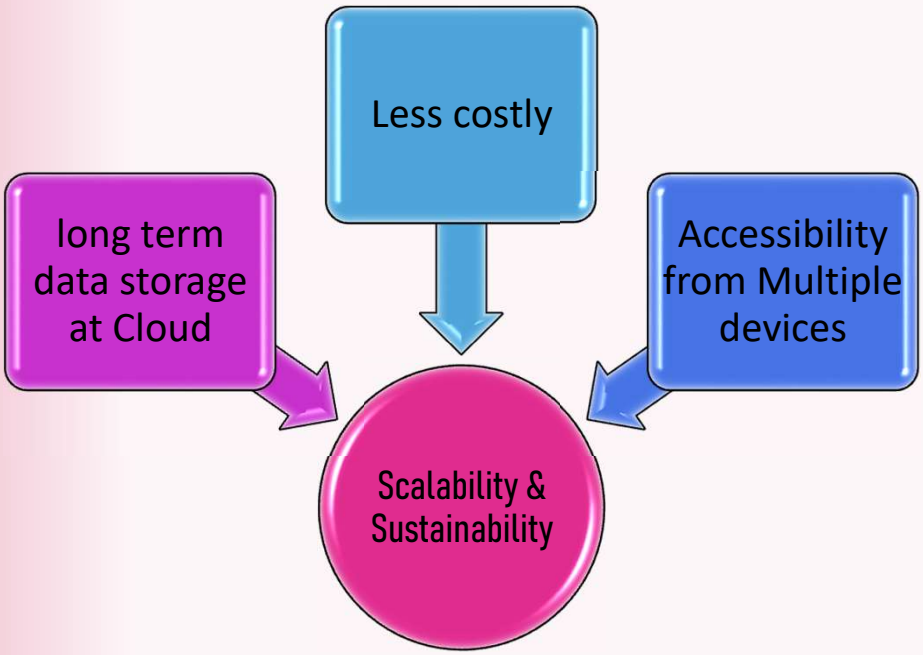
Scalability & Sustainability

As RHIS(**Routine health information systems**) is a less costlier monitoring system, and easily accessible from different devices ,user from any end of the society will get the services. Against a username & ID Data will store at Cloud for a long time span. So this is device independent, can be accessed from multiple devices,



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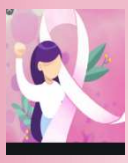
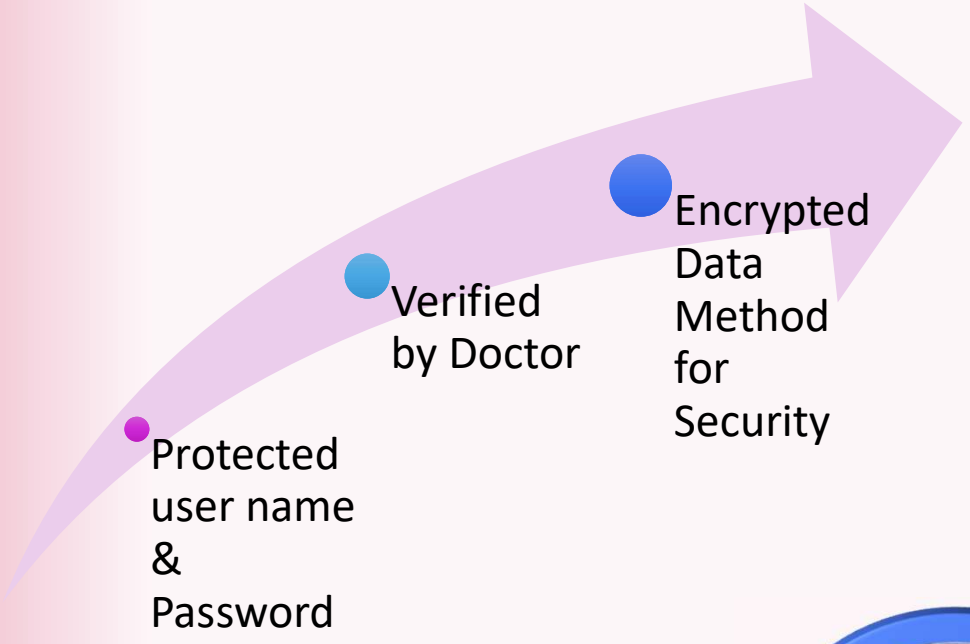


Safety

Every one has their own identity with user name and password including concern family members and doctors. So that their personal information is safe. Only verified doctors and hospitals are part of the app, to ensure the highest safety measures. In case of any alarming sign all of them are notified immediately.

Doctor will verify the data provided by the each member of this screening system

For privacy & security Encrypted Data Method is applied to pass the data to through the cloud



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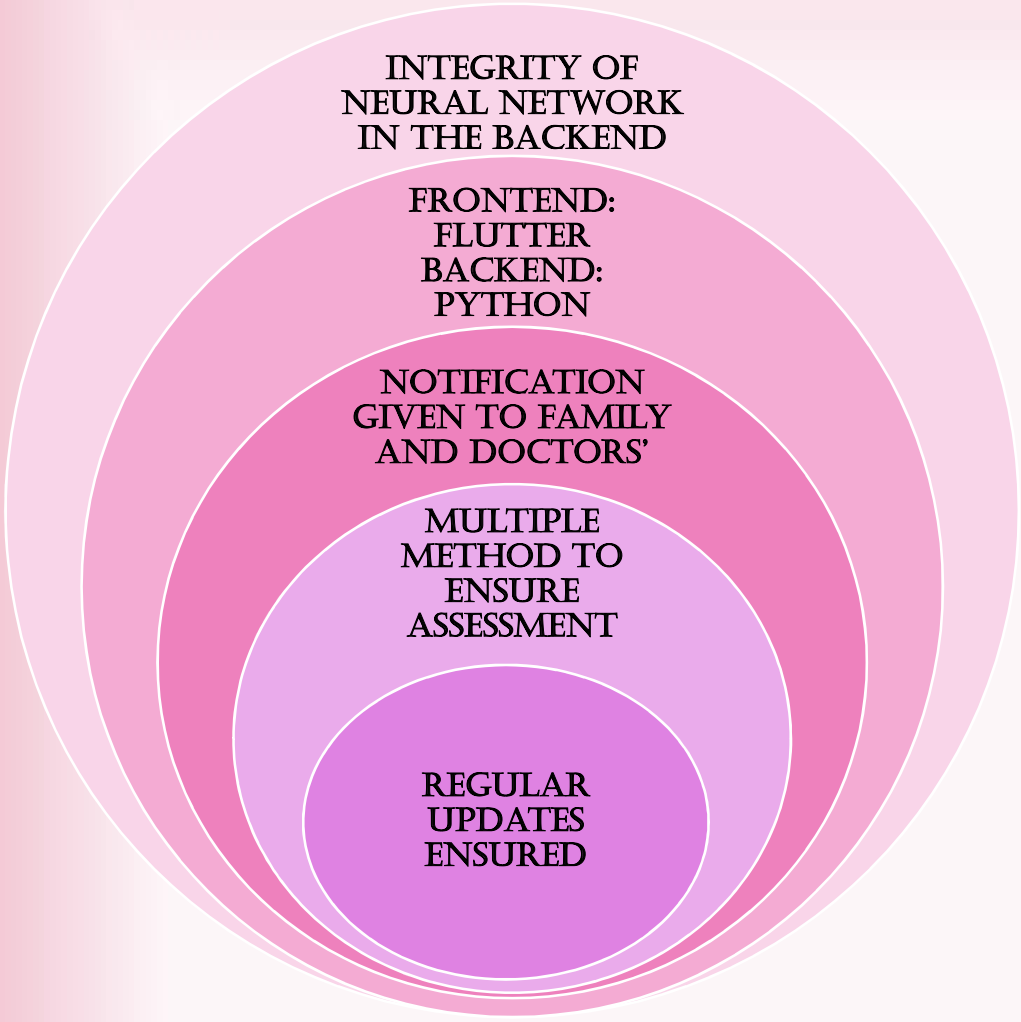
Originality & Innovation



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Biographical Information

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Profile Links: Research Gate
Github
Kaggle
HackerRank
CodeForces
Leetcode

Education

Bangladesh University of Engineering & Technology — Dhaka, Bangladesh
Bachelor of Science in Electrical and Electronic Engineering; Level 3 Term 1 — Expected Date: 2023

Holy Cross College — Dhaka, Bangladesh
Higher Secondary Certificate Examination; GPA: 5.00/5.00 — July 2017

Research Interest

Machine Learning, Data Structure and Algorithm

Relevant Coursework

Probability and Statistics, Linear Algebra, Calculus, Continuous Signals and Processes, Andrew NG's Machine Learning on Coursera.

Project Experience

Note: The projects with asterisk (*) are based on competitions held on Kaggle.

VIP CUP 2020
Video & Image Processing Cup 2020 was organized by IEEE Signal Processing Society .The problem was detection of vehicles from fisheye image. A CNN based network and a network for object detection was used to approach the problem, ***was ranked first runner up*** in the competition

BDOSN IWD DevMania 2021 Project competition
On the occasion of International Women's Day, "DevMania Project Competition" was organized on online by Bangladesh Open Source Network (BdOSN) with the participation of female undergraduate students from different parts of Bangladesh. Our project was diagnosis of pregnant woman health using AI, we proposed an simple Neural Network classifier for Uterine Contraction Analysis and Image processing for Urinalysis. We ***were ranked as first runner up*** in the competition. This project also got us the ***first prize in IEEE Bract Project Competition***

Dhaka AI 2020
This was an AI-based Dhaka Traffic Detection Challenge funded by Elsevier would be co-organized during STI 2020. The task was multiclass detection of vehicles in Dhaka roads. A modified version of YOLO v5 and RetinaNet was ensemble to complete the task, ***was ranked 27th in the leader board***

ADA Lovelace Datathon 2021*
This was Bangladesh's first female datathon which was a classification problem. We handled it by resampling two unbalanced features, doing feature engineering with one hot encoder and a continuous feature by binning. By setting proper parameters extra tree classifier was used to have the best score we achieved. We were able to grab ***11/19 in the leader board*** in this competition

Biographical Information

VinBigData Chest X-ray Abnormalities Detection*

The task is to localize and classify 14 types of thoracic abnormalities from chest radiographs. Here we ensemble four different classifier model to get the prediction results. We were ranked ***304/1277 in the leaderboard*** in the competition

Alaska2-Image-Steganalysis*

The objective of this competition was to create an efficient and reliable method to detect secret data hidden within innocuous-seeming digital images, A CNN based Multiclass Classifier was used solving this task. We were ranked ***261/1095 in the leaderboard***.

HuBMap- Hacking the Kidney*(Running)

Human Bimolecular Atlas Program is working to catalyze the development of a framework for mapping the human body at a level of glomeruli functional tissue units for the first time in history. The task is to detect the functional tissue units (FTUs) across different tissue preparation pipelines, this is a segmentation task

Global Wheat Detection*

The task is to wheat heads from outdoor images of wheat plants, including wheat datasets from around the globe, an attempt to use segmentation for boundary box detection was made

Jigsaw Multilingual Toxic Comment Classification*

The task was RNN based classification of the toxic comments. The EDA analysis was done

Titanic-Machine Learning from Disaster*

Classification based competition whether the passengers would survive or not, EDA and Catboost classification was used

Prostate cANcer graDe Assessment (PANDA) Challenge*

Segmentation based Image classification competition, we attempted using traditional object detection models

Computer Skills

Programming Languages: Python, C/C++, JAVA, R, Ruby, Kotlin, Dart

Numerical Analysis: MatLAB, Microsoft Excel, SQL

Circuit Simulation and Design: PSpice, Psaf

Document Preparation Systems: LaTex, Microsoft Word, PowerPoint

Operating Systems: Windows, Linux

Volunteer Works

Serving as Guest Blogger at Analytics Vidhya
Serving as WebMaster at IEEE EDS branch, Photographer at IEEE BUET Student branch
Serving as Assistant General Secretary of Kantho(BUET)
Serving as Member of BUET Photographic Society
Serving as active member in Kanthoshilon

Activities & Interests

Interested in recitation, music and photography