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Feminine Health Application for Detecting PCOS, PCOD and Providing Remedial Solution

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ABSTRACT: Polycystic Ovary Syndrome (PCOS) and Polycystic Ovary Disease (PCOD) is a very common endocrine and metabolic disorder with the involvement of both genetic and environmental factors. Although much has been clarified on its pathogenesis, diagnosis, clinical manifestations, and therapy, there are still areas of uncertainty. While 11-21% of women of reproductive age have PCOS around 75% women of reproductive age can have polycystic ovaries on ultra sound. In this paper early stage detection for PCOS and PCOD is done by calculating the number of probability of having PCOD and PCOS based upon given user inputs using machine learning algorithm. Since stress level is most obvious reason for hormonal changes, we have focused on finding stress level of women. It also provide the lifestyle changes for PCOS and PCOD so women can treat it at home naturally. This research will help women to detect disease at early stage, which can be help to prevent PCOD and PCOS.

KEYWORDS : BCI-brain computer interface, machine learning, PCOS, PCOD.

I. INTRODUCTION

Poly-cystic Ovarian Syndrome (PCOS) and Poly-cystic Ovarian Disease(PCOD) is the most common disorder in women's at their reproductive age. Its leading cause for infertility, gestational diabetes or pregnancy included high blood pressure and also leads to miscarriage and premature birth of child. General research of PCOS says that it increases fold risk of getting endometrial cancer. So if this disease remains untreated it can lead to death of women to. In case of PCOD and PCOS women's ovaries produce many mature and immature eggs. Most of times this happen due to poor lifestyle, stress, obesity and hormonal imbalance. This are one of the most influential causes of PCOS and PCOD can leads to major chronic disease such as uterus cancer and also damage women's health physically as well as mentally. In most of the cases even if that women face symptoms for PCOD and PCOS they don't go to hospital because of poor mind set of them and society. Therefore, its worthy of attention to screen the PCOS and PCOD patients at primary stage to prevent serious damage to health from these diseases. Since stress is one of the noticeable symptoms of PCOD and PCOS. We are focusing on recognizing this disease by detecting emotional factors of women using Brain Computer Interface This paper mainly focuses on predicting PCOS and PCOD by analyzing data about symptoms using machine learning and to prevent measure causes and movement by providing remedial solutions.

II. LITERATURE REVIEW

This section provides a brief literature work on PCOS and PCOD .Table 1 summarizes literature survey.

Detection and prediction system for PCOS and PCOD using machine learning by Anitaraj and Ashi Ashok . Literature says that about 5-10% of Indian women in reproductive age are affected by the multifaceted endocrine disorder called Polycystic Ovary Syndrome (PCOS) . It is a major cause of an ovulatory infertility and increases the risk for insulin



resistance, obesity, cardiovascular disease and psychosocial disorders. [1] Diagnosis of Polycystic Ovary Syndrome Using Machine Learning Algorithms by Subrato Bharati, Prajoy Podder, M. Rubaiyat Hossain Mondal .This focuses on the data-driven diagnosis of polycystic ovary syndrome (PCOS) in women. For this, machine learning algorithms are applied to a dataset freely available in repository. Also it has given the process of using dataset to predict results.[2] EEG based Stress Level Identification by Guo Jun, Smitha K. G. This investigates detection of patterns in brain waves while induced with mental stress. Electroencephalogram (EEG) is the most commonly used brain signal acquisition method as it is simple, economical and portable.[3] Automated detection of Polycystic Ovarian Syndrome using follicle recognition by Sharvari S. Deshpande , asmita wakankar . In this paper, Number of follicles are detected by ovarian ultrasound image processing using pre-processing which includes contrast enhancement and filtering, feature extraction using Multi- scale morphological approach and segmentation.[4].

Table 1.Summary Of Literature Review

Ref	Methods Used	Research Objective
1	Data-driven diagnosis of PCOD and PCOS.XZ	Diagnosis of PCOD and PCOS Using Machine Learning Algorithms.
2	Making Mobile Health Technologies to improve relevant knowledge & awareness about PCOD and PCOS	Mobile PCOD and PCOS Management and Awareness System.
3	Early Stage Detection And Prevention of PCOD & PCOS by analyzing provided data	Detection And Prediction System For PCOD & PCOS Using Machine Learning Techniques.
4	Implementation Techniques & Facilities Relevant to Brain Computer Interface	Brain Computer Interface Architecture & classification Approach.
5	Classify Stress on EEG features extractors using EEG techniques of BCI	A BCI for Classifying EEG correlates of chronic mental stress

III. METHODOLOGY

A. System Overview

Overall System design and domains consist of two parts. First one is of software development part including applications development for PCOS and PCOD and diseases detection using machine learning algorithm. And ssecond one is hardware part which helps to detect emotional factors including stress level using EEG sensors.

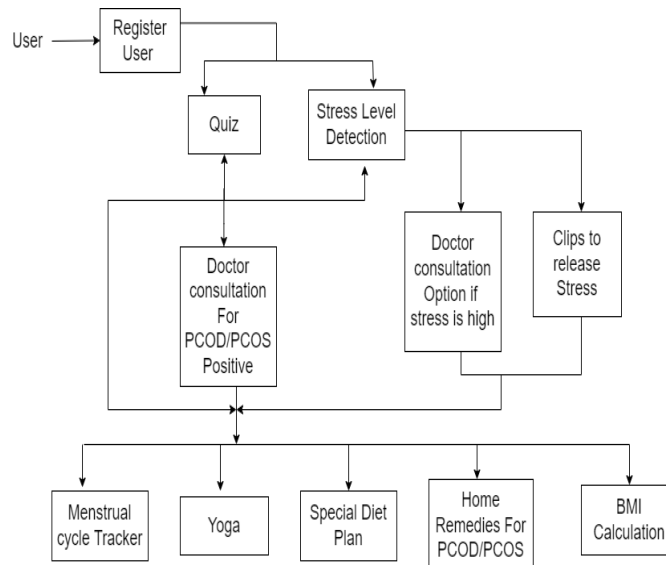


Fig.1 Architecture of Application Interface

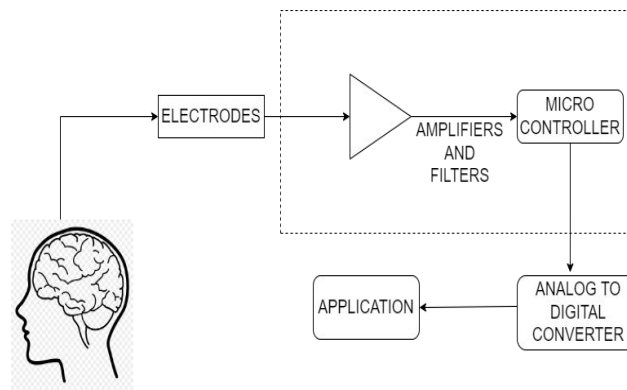


Fig.2 Brain Computer Interface Architecture

This section briefly explains the experiments that are carried out to detect PCOD & PCOS using machine learning & BCI domain. For the experiments software part PHP, HTML, CSS, JavaScript Python languages are used & for the data base purpose phpmyadmin database has used.

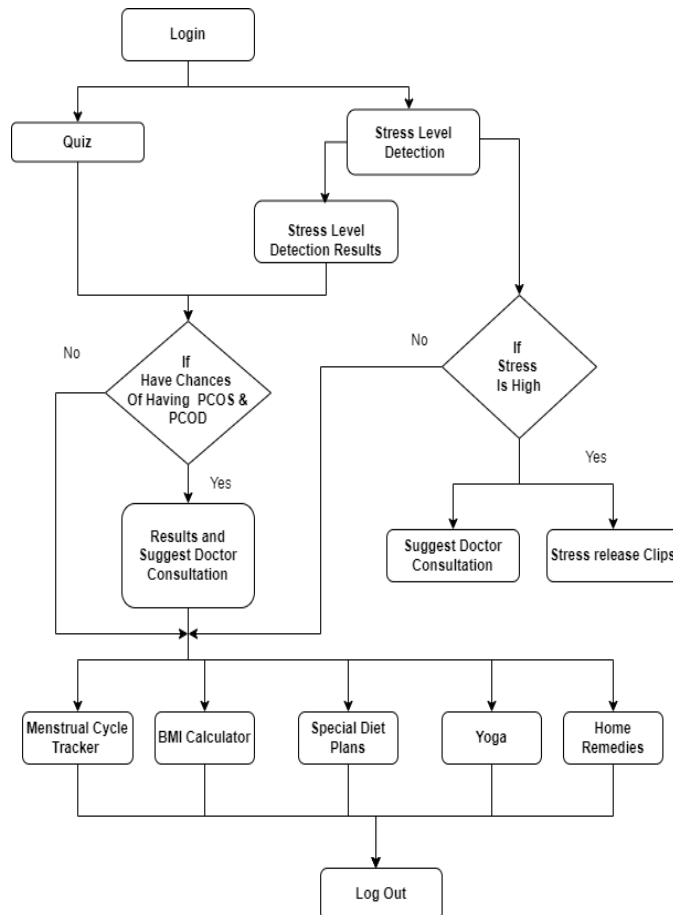


Fig.3 Data Flow Chart

Above mentioned figure explain about data flow in system . Data flow diagram mentioned above shows the actual working

B) Software Modules :

- Registration: This module allow new user as well as previous registered user to log in into system.
- Quiz: The quiz module provides questionnaire for user to predict results based on user input.
- Stress level detection: This module detects stress level of user.
- Menstrual Cycle Tracker: This module allows user to keep track on their menstrual cycle.
- BMI Calculator: This module allows to user enter weight and height to calculate BMI. It gauge whether your weight is in healthy proportion to your height.
- Home Remedies: This module provides different home based natural remedies in brief for PCOS and PCOD patient.
- Veg Diet: The module provides veg diet chart of everyday of week with time.
- Non Veg Diet: The module provides veg chart of everyday of week with time.
- Yoga: this module provides different yoga techniques for user to maintain their health.

C) System Hardware :

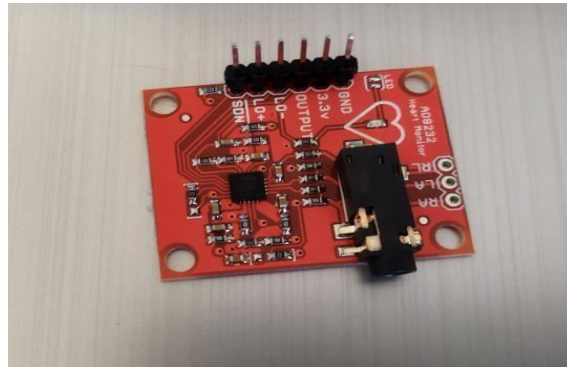


Fig 4 : Amplifier



Fig 5: Electrode pads



Fig 6: Head Electrode Cable Line Connector



Arduino

Fig 7: Arduino Uno AD8232

We devised a supervised machine learning model for the classification of human stress. After recording data fetched from EEG signals, we did pre-processing because data contained too much noisy information due to outside circumstances. EEG signals are decomposed into different frequency bands. For feature extraction, power spectral densities of different neural oscillations namely, delta (1–3 Hz), theta (4–7 Hz), alpha (8–12 Hz), beta (13–30 Hz), gamma (25–43 Hz), slow (4–13 Hz), and low beta (13–17 Hz) were computed from each channel.

Machine Learning Algorithm for forecasting :

1) Linear Regression Algorithm :

Linear regression is an algorithm in machine learning based on supervised learning. It is commonly used to find the relationship between a variable and to forecast the results. It predicts the value of a dependent variable based upon an independent variable.

$$\theta = (X^T X)^{-1} \cdot (X^T y)$$

In the above equation,

θ :- hypothesis parameters

X :- Input feature value of instance.

Y :- Output value of instance.



IV. RESULTS AND DISCUSSION SOFTWARE RESULTS

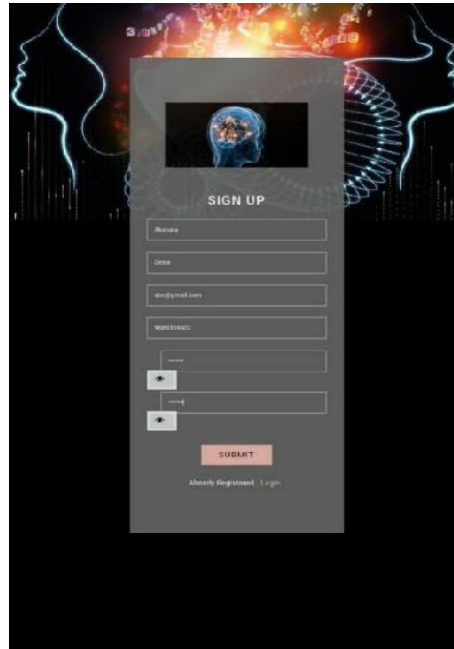


Fig 8: Login page

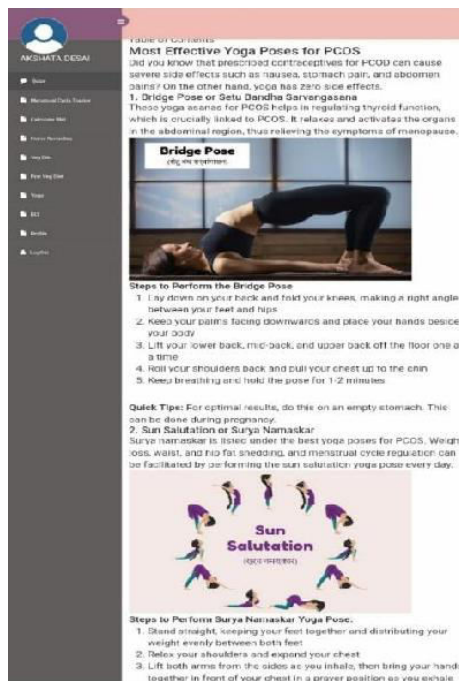


Fig 9: Lifestyle changes



Fig 10 : Special diet plans

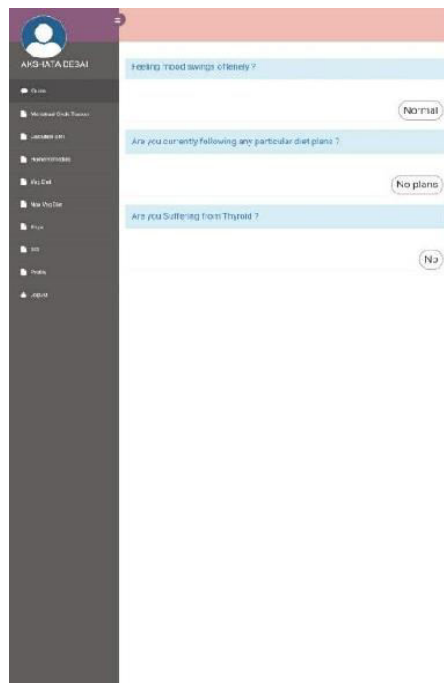


Fig 11: Quiz for user

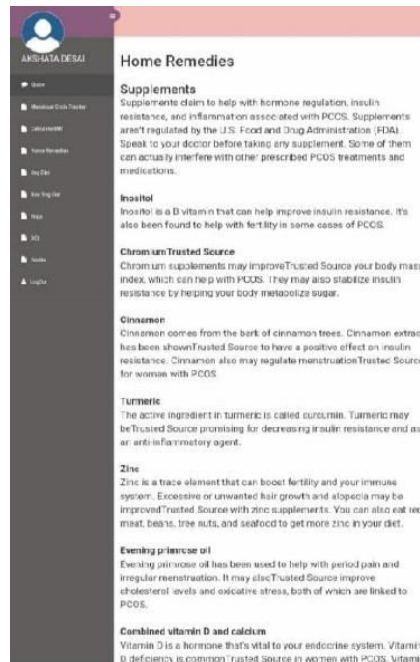


Fig 12 : Home Remedies

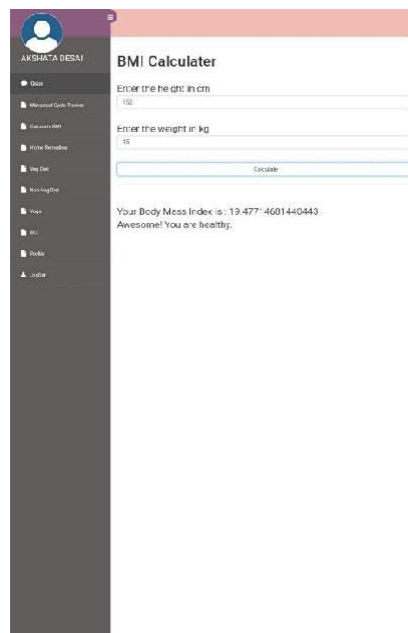


Fig 13: BMI Calculator

Above pictures show the how the software application looks like and some modules are showed in above pictures.

About the emotional behavioural detection, it detect the human behavioural changes using EEG sensors and use of other above hardware. It provide results in manner of high and low level ratio to user.

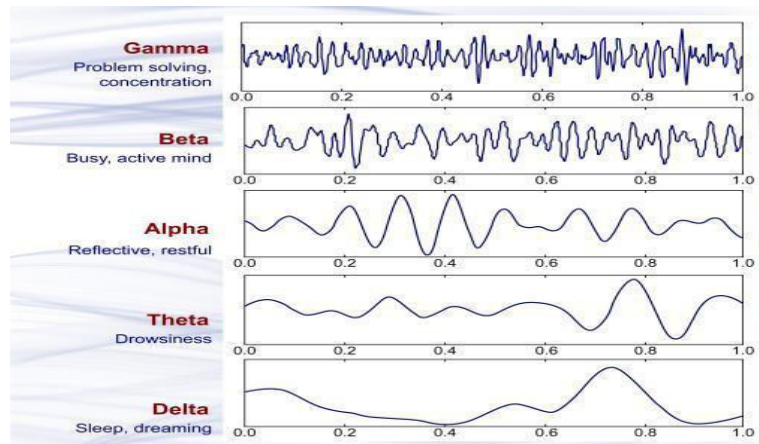


Fig 14: This image shows how waves of EEG signal represents result according to condition.

V. CONCLUSION

This paper In the results of PCOS and PCOD detection has been achieved using two different domain namely Machine learning and brain computer interface respectively. Poly cystic ovarian disease and syndrome is detected using linear regression algorithm of machine learning. EEG sensor of brain computer interface has used to compute the stress level and emotional factors. It presents the overall diagnosis of PCOD and PCOS disease in women's for this, diagnosis Brain Computer Interface and machine learning algorithms are applied. Brain Computer Interface (BCI) is applied to system to major the emotional behavioral imbalance (stress) of women and data set have provided according to their condition. Linear regression algorithm of machine learning is applied to learn about symptoms of women about their disease. According to extracted probability of symptoms results are provided. As the future work, medical industries part can be included example, doctor consultation for more accurate results.

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