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Fembot AI: Intelligent PCOS Health Monitoring and Adaptive Personalized Care System

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Abstract
Polycystic Ovary Syndrome (PCOS) is one of the most prevalent hormonal disorders affecting women of reproductive age, leading to long-term complications such as infertility, metabolic disorders, and mental health issues. Despite its widespread occurrence, early diagnosis and continuous monitoring remain challenging due to fragmented healthcare data, irregular symptom patterns, and limited personalized care mechanisms. This paper presents FemBot AI, an intelligent PCOS health monitoring and adaptive personalized care system that integrates data collection, preprocessing, analytics, conversational interaction, and decision support within a unified framework. The proposed system collects patient health data through questionnaires, lifestyle inputs, and historical medical records, processes it using machine learning–based analytics, and delivers personalized health insights through a conversational AI interface. The novelty of FemBot AI lies in its closed-loop health monitoring approach, where analytical insights dynamically adapt lifestyle recommendations, risk assessments, and user guidance. Experimental observations demonstrate improved accessibility, reduced dependency on manual clinical consultations for preliminary assessment, and enhanced user engagement through conversational interaction. The system provides a scalable and practical solution for intelligent women's healthcare support.

Keywords *- PCOS Monitoring, Women's Health Analytics, Conversational AI, Personalized Healthcare, Machine Learning, Clinical Decision Support.*

1. Introduction
Polycystic Ovary Syndrome (PCOS) is a multifactorial endocrine disorder that impacts women's reproductive, metabolic, and psychological health. It is commonly associated with hormonal imbalances leading to irregular menstrual cycles, polycystic ovaries, weight gain, insulin resistance, and increased risk of anxiety and depression. Global health studies estimate that PCOS affects nearly 8–13% of women of reproductive age worldwide. However, due to diverse symptom presentation, social stigma, and limited access to continuous health monitoring, a large proportion of affected women remain undiagnosed or misdiagnosed. Traditional PCOS diagnosis and management rely heavily on episodic clinical visits, laboratory tests, and subjective symptom reporting. These approaches often fail to provide personalized, continuous, and data-driven care. Furthermore, women in rural or resource-limited settings face additional barriers such as limited access to specialists and delayed diagnosis. Advances in artificial intelligence, machine learning, and conversational systems offer opportunities to transform women's healthcare by enabling intelligent symptom assessment, risk prediction, and personalized recommendations. However, most existing solutions address isolated components such as symptom tracking apps or static health dashboards without integrating analytics, personalization, and user interaction into a single workflow.

2. Problem Statement
The effective diagnosis and management of PCOS face several critical challenges:

- **Lack of Continuous Monitoring** PCOS symptoms fluctuate over time and are

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influenced by lifestyle, stress, and hormonal changes. Traditional healthcare systems do not provide continuous tracking mechanisms.

- **Fragmented Health Information** PCOS-related data such as menstrual patterns, lifestyle habits, body mass index, and medical history are often scattered and unstructured.
- **Delayed Diagnosis and Awareness** Many women remain unaware of PCOS symptoms or delay seeking medical advice due to social stigma or lack of information.
- **Generic Health Guidance** Existing applications provide generalized recommendations that do not adapt to individual user profiles or evolving health conditions.
- **Limited Accessibility** Access to gynecologists and endocrinologists is restricted in rural and resource-limited areas.

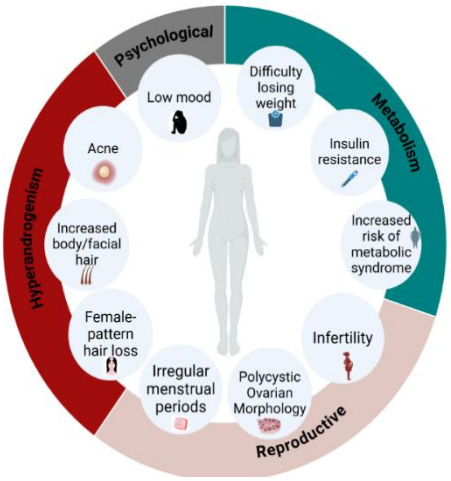

Figure 1 Clinical Manifestations and Symptom Domains of Polycystic Ovary Syndrome (PCOS)

3. Proposed System

The proposed system, FemBot AI, is an intelligent PCOS health monitoring platform designed to provide continuous and personalized healthcare support for women affected by Polycystic Ovary Syndrome (PCOS). The system collects user health data such as menstrual[7] cycle patterns, symptoms, lifestyle habits, Body Mass Index (BMI), and medical history through an interactive digital interface. Machine learning algorithms analyze the collected data to predict PCOS risk levels and identify symptom[6] patterns. Additionally, an NLP-based chatbot enables real-time interaction with users for symptom reporting and health guidance. Based on the analysis, the system generates personalized recommendations including diet plans, exercise routines, and lifestyle modifications. The platform also ensures data privacy and supports future integration with wearable devices for continuous health monitoring[1].

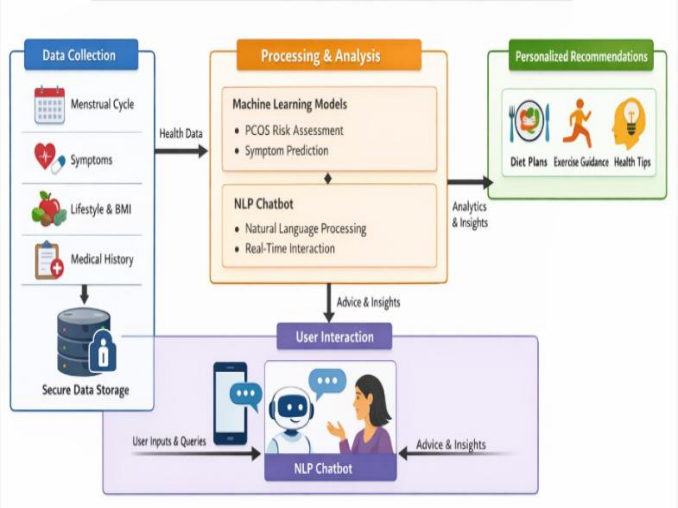

Figure 2 Block diagram of the proposed FemBot AI framework integrating machine learning and NLP modules

4. System Arhitecture

The system architecture of FemBot AI follows a structured and sequential workflow for intelligent PCOS risk assessment and personalized care delivery. The process begins with the collection of user input data, including menstrual cycle details, reported symptoms, and lifestyle-related information. This raw data is subjected to data pre-processing techniques such as cleaning, normalization, and handling missing values to ensure quality and consistency. After pre-processing, significant PCOS-related indicators are identified through feature extraction, which transforms[8] the processed data into meaningful attributes required for analysis. These extracted features are provided as input to the machine learning model, which performs PCOS prediction by learning patterns associated with

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hormonal imbalance and symptom severity. The prediction results are securely stored in the database for future reference and trend analysis.Based on the model[10] output, a PCOS risk assessment module categorizes the user's health status into normal or PCOS-detected conditions. If PCOS risk is identified, the system activates a[2] recommendation and alert module that generates personalized diet plans, exercise guidance, and lifestyle modification tips. In cases where normal health status is detected, the system continues monitoring without generating alerts[3].

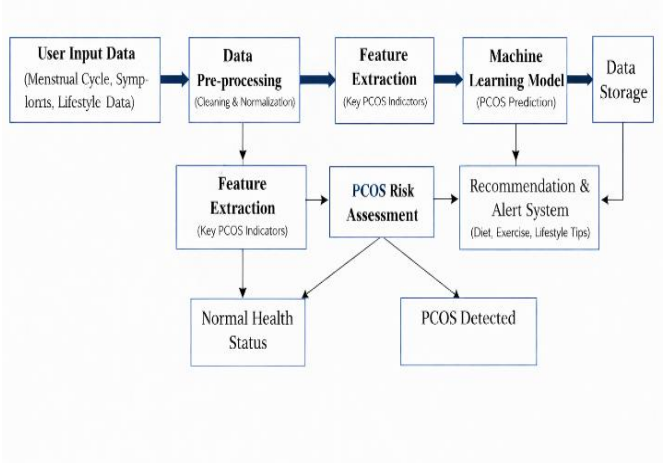

Figure 3 System architecture illustrating data preprocessing, feature extraction, and machine learning–based PCOS risk assessment

5. System Arhitecture

The experimental evaluation of FemBot AI shows that the[9] system effectively analyzes user health data such as menstrual cycle information, symptoms, and lifestyle attributes to generate meaningful insights. Data preprocessing and feature extraction improve input quality and ensure reliable model performance.The machine learning model accurately classifies PCOS risk levels by identifying key symptom patterns and health indicators[4]. The system enables early risk detection through continuous data analysis.Based on prediction results, the system generates personalized recommendations including diet plans, exercise suggestions, and lifestyle guidance. The NLP-based chatbot enhances user interaction by allowing real-time symptom reporting and health guidance. Overall, the integration of machine learning and conversational AI provides an effective, accessible, and user-centric solution for intelligent PCOS health monitoring and management[5].

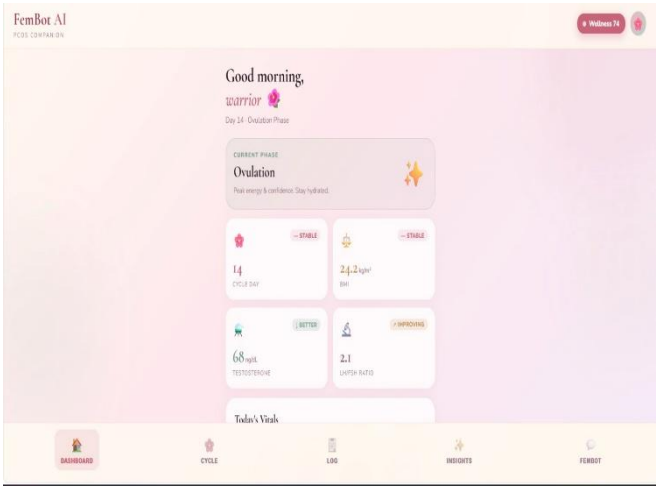

Figure 4 Login page of the proposed FemBot AI PCOS Health Assistant system

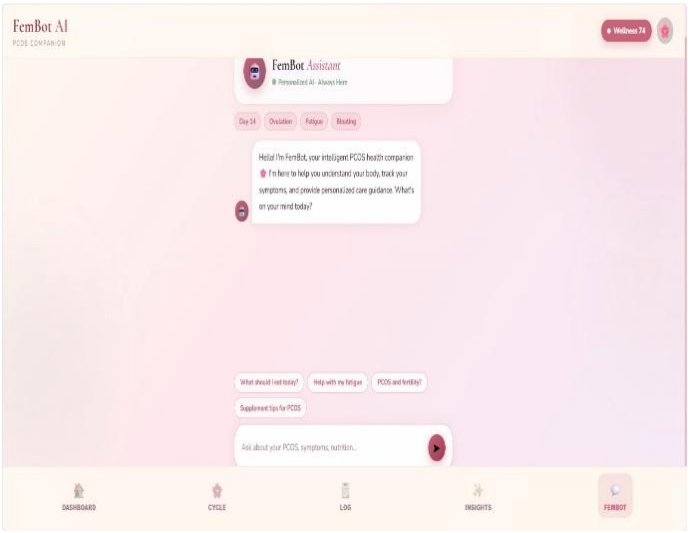

Figure 5 Interactive chatbot interface of FemBot AI for PCOS symptom assessment

Conclusion

FemBot AI is an intelligent system developed for effective PCOS health monitoring and personalized care. The system collects user health data such as menstrual cycle patterns, symptoms, lifestyle habits, and medical information through an interactive

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platform. Machine learning models analyze this data to predict PCOS risk levels and support early detection. Based on prediction results, the system provides personalized recommendations including diet plans, exercise routines, and lifestyle modifications. The integration of machine learning and NLP-based chatbot interaction improves user engagement and enables continuous health monitoring. Overall, FemBot AI provides a scalable, accessible, and user-centric solution for improving PCOS healthcare management.

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