FYP Proposal: PCOS Predictor

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Introduction:

Polycystic Ovary Syndrome (PCOS) is a widespread yet underdiagnosed health issue in Pakistan. To address this, we propose developing a mobile application that leverages Artificial Intelligence (AI) to predict a user's likelihood of having PCOS based on their symptoms, medical history, and lifestyle factors.

The app will feature a PCOS predictor system powered by machine learning, providing users with an early risk assessment and encouraging timely medical consultation. Additionally, it will offer PCOS-friendly meal planning, period tracking, and educational resources to help users manage their condition effectively. By integrating AI with healthcare, this platform aims to improve awareness, early detection, and self-care for women across Pakistan.

Targeted Problem:

Polycystic Ovary Syndrome (PCOS) is a significant health concern in Pakistan, with studies indicating a prevalence rate exceeding 50% among women of reproductive age. Despite its widespread occurrence, PCOS often remains undiagnosed due to a lack of awareness, cultural stigmas, and limited access to specialized healthcare.

Many women suffer from symptoms like irregular periods, excessive hair growth, acne, and weight fluctuations but struggle to find proper medical guidance.

A major issue is the medical bias surrounding PCOS. Many gynecologists immediately attribute the condition to weight, telling patients that losing weight will resolve most of their symptoms. I have personally experienced this frustration—seeking help, only to be labeled as "fat" rather than being given proper medical attention. This approach is not only dismissive but also misleading because PCOS affects individuals of all body types, not just those who are overweight.

The lack of accessible diagnostic tools and compassionate healthcare solutions leaves many women feeling helpless and unheard. Our proposed mobile application aims to bridge this gap by providing an AI-driven platform for early detection, personalized management plans, and educational resources tailored to the Pakistani context. Beyond just predicting PCOS risk, the app will also offer PCOS-friendly meal planning, period tracking, and reliable health information, empowering women to take control of their health without fear of judgment.

This platform is about changing the narrative—helping women feel fearless and powerful when seeking help, ensuring they receive the care and support they deserve. By integrating AI with healthcare, we aim to improve awareness, early diagnosis, and self-care for women across Pakistan, free from societal and medical bias.

What makes our idea unique?

While several platforms address aspects of Polycystic Ovary Syndrome (PCOS) management, our proposed application offers a unique and comprehensive approach tailored specifically to the needs of Pakistani women.

Existing Platforms:

- AskPCOS: Developed by Monash University, this app provides information about PCOS, symptom tracking, and educational resources. However, it does

not offer AI-driven predictive capabilities or personalized meal planning.

- Cysterhood: This app focuses on weight loss for women with PCOS, offering diet and exercise plans. While it provides structured programs, it lacks AI-based diagnostic tools and is not specifically tailored to the cultural context of Pakistani women.

- Wonder Women: A platform offering personalized PCOS reversal programs, including medical expertise, nutrition, and lifestyle support. While comprehensive, it primarily emphasizes weight management and may not fully address the need for early detection through AI-driven predictions.

Our application distinguishes itself by integrating an AI-driven PCOS predictor system, enabling early detection based on individual symptoms and medical history. Beyond prediction, it offers PCOS-friendly meal planning, period tracking, and educational resources, providing a holistic approach to management. Importantly, it is designed with cultural sensitivity, aiming to empower Pakistani women to seek help without fear of judgment, addressing the specific challenges and stigmas they may face.

By combining advanced technology with comprehensive support tailored to the Pakistani context, your platform fills a critical gap in existing PCOS management solutions.

Research Conducted:

To ensure that our application effectively addresses the PCOS crisis in Pakistan, we have conducted extensive secondary research, analyzing medical studies, reports, and global statistics on PCOS prevalence. Studies suggest that over 50% of women of reproductive age in Pakistan may have PCOS, yet many remain undiagnosed due to a lack of awareness and medical bias. We have also gathered qualitative data through discussions with women who have struggled to get diagnosed, revealing

common frustrations such as being dismissed by doctors and societal stigma. Moving forward, we plan to conduct surveys among Pakistani women to collect firsthand data on their experiences, symptoms, and barriers to diagnosis. This research will shape the features of our application, ensuring it meets the real needs of users.

Key Technical Aspects:

1. AI & Machine Learning for PCOS Prediction

The core feature of our application is an AI-powered PCOS predictor system that utilizes machine learning algorithms to assess the likelihood of PCOS based on user inputs. These inputs may include symptoms, menstrual history, lifestyle factors, and medical history.

- Technology Stack:
    - Machine Learning Frameworks: TensorFlow, Scikit-learn, or PyTorch for training predictive models.
    - Data Collection & Processing: Medical research datasets combined with potential user-contributed data.
    - Model Training: Implementing classification models like Decision Trees, Random Forest, or Neural Networks to improve accuracy.
- Prediction Mechanism:
    - Users will fill out a questionnaire based on known PCOS risk factors.
    - The model will analyze the responses and provide a risk assessment score with suggestions for further medical consultation.

2. Mobile Application Development

The application will be developed using Flutter, a cross-platform framework, that ensures seamless functionality on both Android and iOS devices.

- Technology Stack:
    - Frontend Development: Flutter (Dart programming language).
    - State Management: Provider (to efficiently manage user sessions, settings, and app state).
    - UI/UX Design: A clean, accessible interface with a light pink sky theme for a calming user experience.

- User Experience Enhancements:
    - Intuitive Navigation: Easy-to-use tabs for the predictor, period tracker, meal planner, and educational resources.
    - Personalized Dashboard: Users will have a dashboard displaying their prediction results, health logs, and recommended articles.

3. Database & Data Security

Since the application will handle sensitive health information, data privacy and security will be a top priority. We will use Firebase Firestore as the primary cloud-based NoSQL database to store user data securely.

- Technology Stack:
    - Database: Firebase Firestore (real-time database for scalability and synchronization).
    - Authentication: Firebase Authentication (Google Sign-In, Email/Password).
    - Security Measures:
        - End-to-end encryption for sensitive user data.
        - Role-based access controls (users can only access their data).
        - Compliance with HIPAA-inspired security standards for health-related applications.

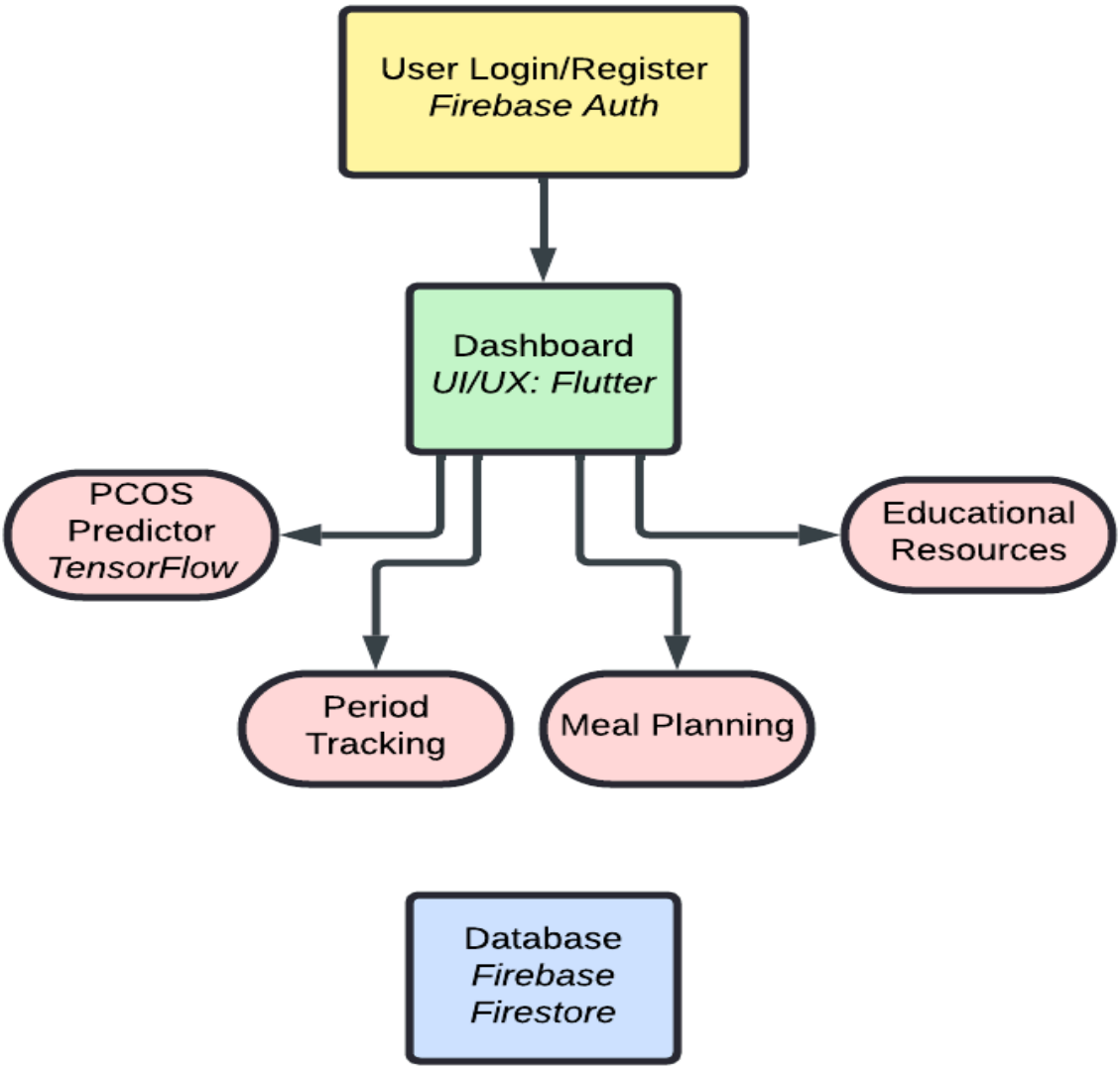
4. Additional Features

Beyond PCOS prediction, the application will provide essential health management tools to help users take control of their condition:

- PCOS-Friendly Meal Planning:
    - A meal recommendation system offering balanced, hormone-friendly diet plans.
    - Categorized food suggestions (low glycemic index foods, anti-inflammatory diets, etc.).
    - Option to save meal preferences for personalized recommendations.
- Period Tracking:
    - A menstrual cycle calendar where users can log their periods, symptoms, and mood changes.
    - AI-based predictions for ovulation and next period dates.
    - Cycle irregularity alerts, helping users track hormonal imbalances.
- Educational Resources:

- A curated library of articles, guides, and expert insights on PCOS.
- AI-powered chatbot support for answering common PCOS-related queries.
- Community Support Section: A forum for users to connect and share experiences.

Flowchart to elaborate on our idea:



Appendix:

What is PCOS?

PCOS (Polycystic Ovary Syndrome) is a common hormonal disorder that affects women, usually during their reproductive years. It can cause irregular periods, weight gain, acne, excessive hair growth, and difficulty in getting pregnant. Despite the name, you don't always have to have cysts on your ovaries to have PCOS.

What Happens in the Body?

PCOS mainly affects hormone levels. People with PCOS often have:

1. Higher levels of androgens ("male hormones") – This can lead to acne, excess facial/body hair (hirsutism), and hair thinning on the scalp.
2. Irregular menstrual cycles – Ovulation (release of eggs) may not happen regularly, leading to missed or unpredictable periods.
3. Insulin resistance – The body struggles to use insulin properly, which can lead to weight gain and increase the risk of type 2 diabetes.

Symptoms of PCOS

Not everyone experiences the same symptoms, but common ones include:
✅ Irregular or absent periods
✅ Weight gain (especially around the belly)
✅ Excess facial and body hair (hirsutism)
✅ Thinning hair on the scalp
✅ Oily skin & acne
✅ Dark patches on the skin (especially on the neck or underarms)
✅ Difficulty getting pregnant (infertility in some cases)

What Causes PCOS?

The exact cause of PCOS isn't fully known, but it is linked to genetics, hormones, and insulin resistance. It runs in families, meaning if your mother or sister has it, you might have a higher chance of developing it too.

Can PCOS Be Cured?

There is no permanent cure, but PCOS can be managed with:
🔹 Healthy eating (balanced diet with whole foods, less sugar).

🔹 Regular exercise (to improve insulin sensitivity).
🔹 Medication (such as birth control pills to regulate periods or Metformin to manage insulin resistance).
🔹 Lifestyle changes to balance hormones and reduce symptoms.

Why is PCOS a Big Concern?

If left untreated, PCOS can lead to:
⚠️ Infertility (difficulty in getting pregnant)
⚠️ Diabetes & high blood pressure
⚠️ Heart disease risk
⚠️ Depression & anxiety

Many women struggle to get diagnosed because doctors often dismiss their symptoms as "normal period issues" or just tell them to "lose weight." This is why awareness and proper support are so important!