LifeNest: Ensuring Healthy Beginnings for Rural

NewbornsOur team has developed a comprehensive maternal health monitoring solution that bridges the gap between expectant mothers and healthcare providers. The system offers a holistic approach to pregnancy care through a mobile application that integrates prenatal tracking, postnatal support, and remote monitoring capabilities. By leveraging portable ECG technology and intuitive tracking features, we aim to improve maternal health outcomes, especially in underserved communities.

Future Enhancements

While our current prototype demonstrates significant functionality, we plan several enhancements：

- Integration with additional wearable devices beyond ECG
- Machine learning algorithms for predictive analytics
- Integration with hospital electronic health records
- We are planning to include Semen Analysis for Men and PCOS issues for Women along with this Application.

Project Status

The healthcare screens are currently in active development.

- Core functionality for fetal growth tracking and ECG integration has been implemented, with user testing underway.
- Anaemia and Hypertension screens are implemented.
- App is integrated with ECG portable Device, it can be connected in Bluetooth.
- The complete application is projected to be ready for pilot deployment within the next development sprint.

Module 1:   User Registration & Profile Management

Requirements:

- Multi-user registration - Profile creation for pregnant women and healthcare providers and Doctors and Separate Admin Login is there to maintain the overall progress.

Registration(Step -1):

- In-person visits for Registration to healthcare facilities(**Health workers** (Offline Method)**)**
- Online Registration(Entirely Digitalised):
  - Online registration is now available to expectant mothers via the mobile application. This removes the requirement for **in-person visits to healthcare facilities**, shortens wait times, and simplifies the registration procedure. The system has **been entirely digitalised.**

    Example:

      - Without Pregnant Registration (lengthy application procedures will be there to get the birth Certificate)

- <mark>Pregnant Unique ID</mark> <mark>Registration</mark> (**both Applicant and Health worker can do this**(Offline Method))
  - <mark>Pregnant Unique ID</mark> Eligibility
    - Should be pregnant
    - Should be resident of Respective State

- Documents Required for <mark>Pregnant Unique ID</mark> <mark>Registration</mark>:
  - Voter ID
  - Valid Passport
  - Aadhar Card
  - Ration Card
  - Marriage Certificate
  - Driving License
  - Bank Passbook
  - Job Card of Registration
  - Chief Minister Comprehensive Scheme's Health insurance card

- Option to add pregnancy details(Can be completed this details in both health worker and pregnant women Login(can do in Self with this app))
  - Expected delivery date(Need to calculate)
  - trimester tracking
  - medical history
  - Demographic data collection (age, location, socioeconomic status)
  Optional
  - Multi-language support (Language preferences (English, Gujarati, Hindi)).
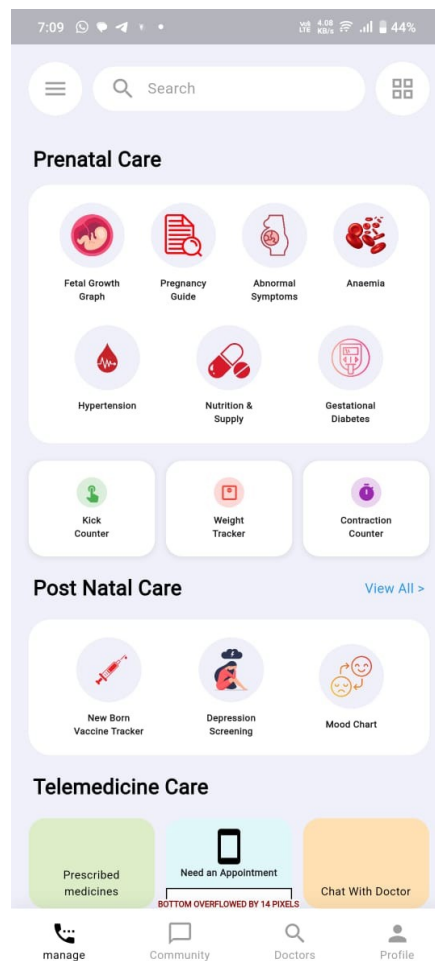 - Offline functionality for areas with limited connectivity.

Module 2:   Admin Dashboard

Requirements:

- Manage registered healthcare providers and Doctors.

- Approve registration of Doctor and User and Health workers.

Module 3: Pregnant Women's Dashboard :

High-Risk Pregnancy Monitoring & Tracking & Alerts:

<mark>**Prenatal Care Module**</mark>

Requirements:

Automated Reminders & Alerts:

- Prenatal check-up schedules(Automated reminders for upcoming check-ups (SMS and in-app)).
- Vaccination reminders (both mother & baby)
- Nutrition & supplement intake reminders

Requirements:

- Daily/weekly symptom tracker(Pregnancy Tools)
  - o   Baby Development
    - ▪   We need to show the Current week and some description about that week with tips
- gestational diabetes,

- Emergency SOS button with geolocation

Module 4 : Fetal Growth Tracking

A Fetal Growth Tracking Graph is a visual representation of a fetus's growth over time during pregnancy. It helps healthcare providers monitor the baby's development and detect any potential growth abnormalities. The graph typically plots various fetal growth parameters against gestational age (weeks).

Our Mobile App screens(Fetal Growth):
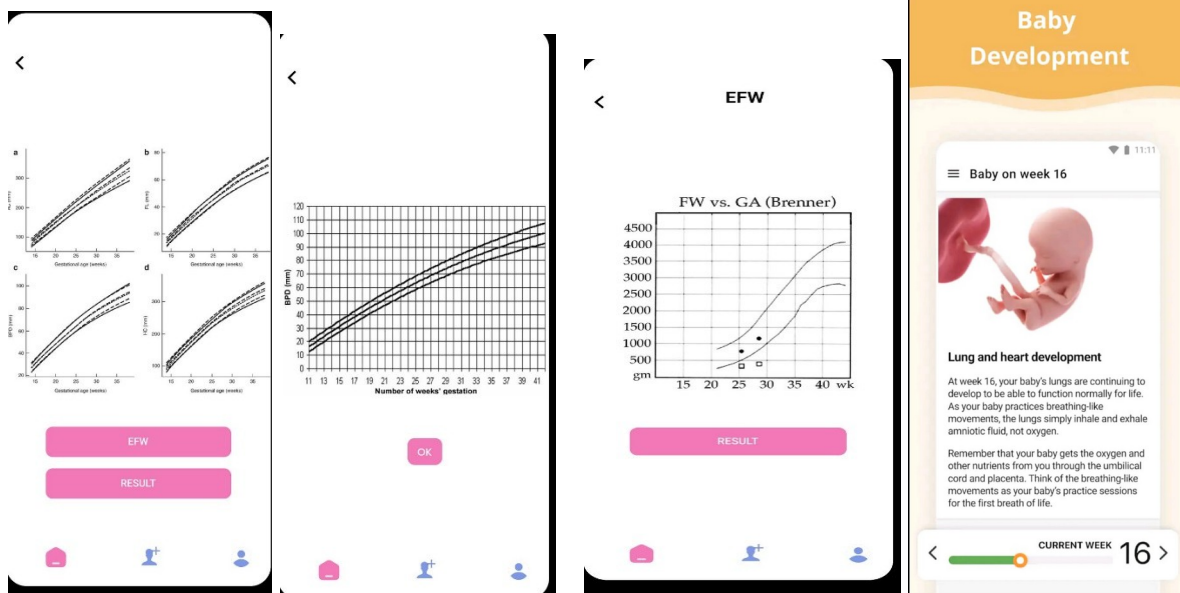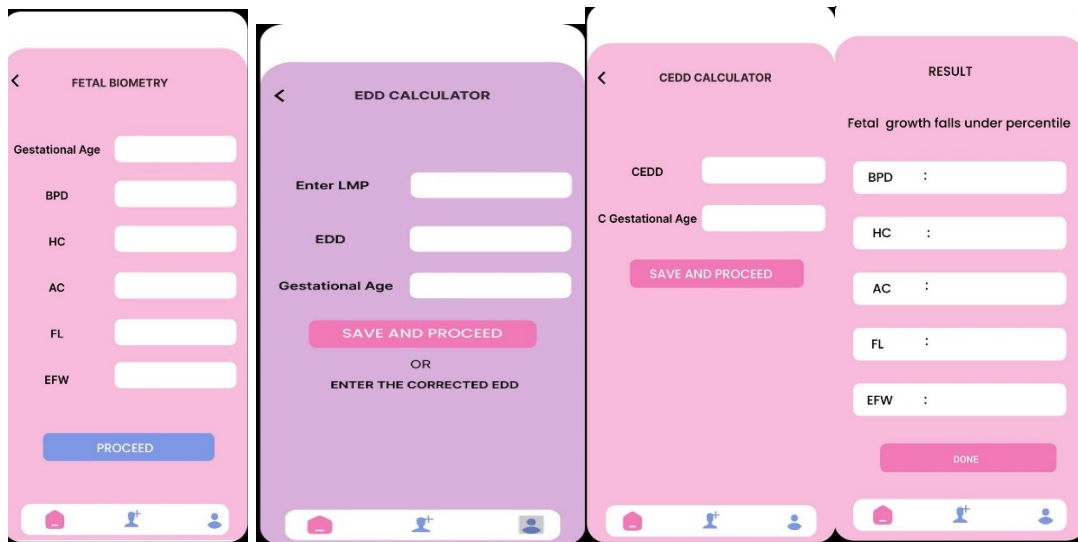
Common Parameters Tracked in the Graph:

- Fetal Weight (Estimated Fetal Weight - EFW)
- Head Circumference (HC)
- Abdominal Circumference (AC)

- Femur Length (FL)
- Biparietal Diameter (BPD) - Skull Width

Purpose:

- Monitor fetal well-being over different trimesters
- Values are plotted against standardized growth percentiles (10th, 50th, 90th, etc.)`
- Assist in diagnosing abnormalities
- Compares growth metrics against standard percentiles
- Offers educational content about fetal development stages
- Alerts healthcare providers to potential growth concerns

Alert in abnormal Situation:

- Alerts system for abnormal symptoms (e.g. fetal movement changes)

Module 5 :   Real-time monitoring of vital signs (if integrated with wearables):

Portable ECG Integration

A standout feature of our solution is the integration with portable ECG devices for remote monitoring:

- Enables real-time ECG data transmission to healthcare providers
- Allows for early detection of cardiac abnormalities
- Supports continuous monitoring for high-risk pregnancies
- Includes automated analysis to flag potential concerns
- Stores historical data for trending and comparative analysis
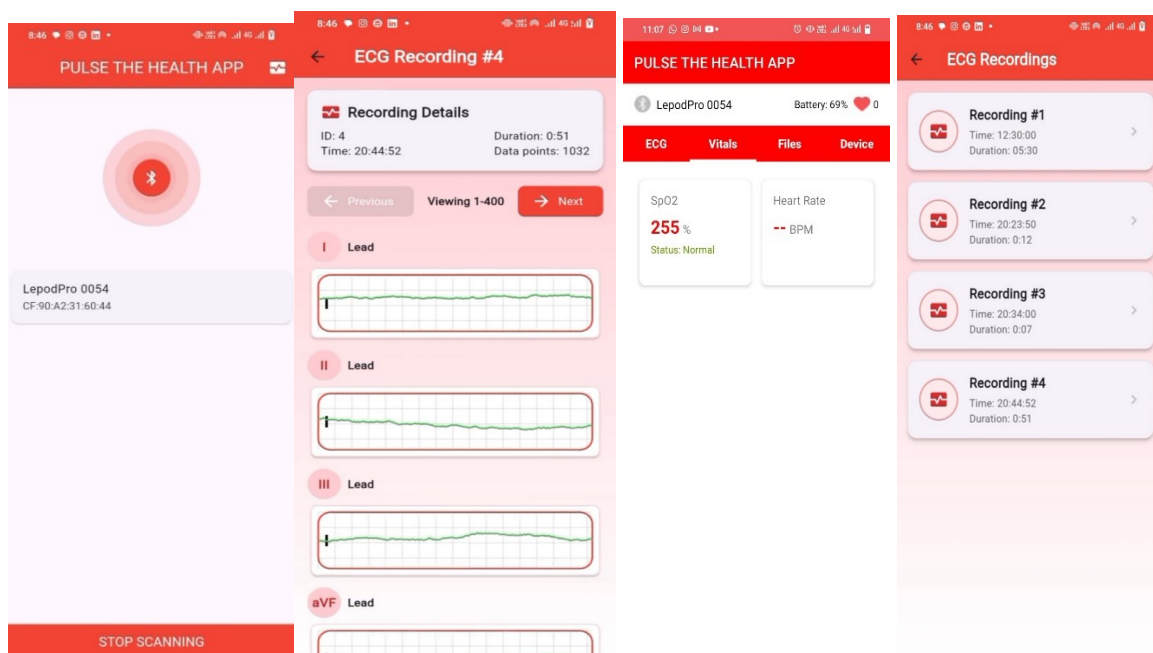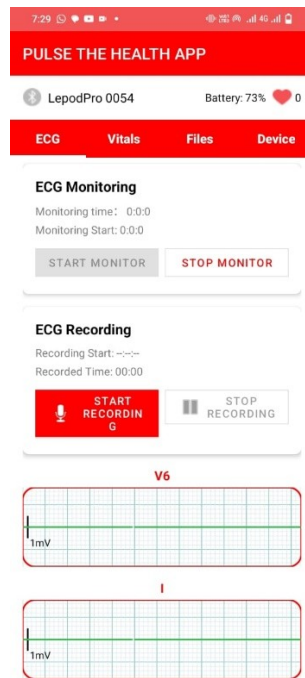
Module 6 :   ==Comprehensive Pregnancy Monitoring==

Our system provides a full suite of pregnancy monitoring tools:

- Weight tracking with trend analysis
- Fetal movement (kick) counter with daily targets
- Contraction timer for labour preparation
- Automated alerts for abnormal patterns
- Customizable reminders for medications and appointments

Weight Tracker

Helps pregnant women track their weight gain and ensure it's within a healthy range.

Features:

- Users can log their weight manually or sync with smart scales.
- Generates graphs showing weight trends over time.
- Provides insights on whether weight gain is within the recommended range for their BMI.
- Weekly/monthly reminders for weight check-ins.

Implementation:

- **Database:** Store user weight data with timestamps.
- **Charts/Graphs:** Use libraries like Recharts (React Native) or Charts (Flutter) to visualize weight trends.
- **Reminders:** Use push notifications for periodic weight log reminders.

Kick Counter:

Tracks fetal movements, helping mothers monitor baby activity and detect abnormalities.

Features:

- Users can tap a button to record each baby kick.
- Timer mode to count kicks within a certain time (e.g., 10 kicks in 2 hours).
- Daily/weekly summaries with average kicks per session.
- Alerts if kick count is significantly lower than usual.

Implementation:

- **Simple UI:** A large button to log kicks easily.
- **Countdown Timer:** To record kicks within a time frame.
- **Data Storage:** Store kick data in local storage or Firebase for tracking trends.
- **Notifications:** Remind users to track kicks at the same time daily.
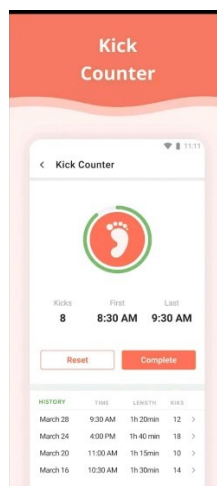
Contraction Counter ⏳

Helps expectant mothers monitor contractions to determine when labor is starting.

Features:

- One-tap button to start/stop contraction recording.
- Displays duration and time between contractions.
- Contraction pattern analysis to determine when it's time to go to the hospital.
- Exportable contraction history for doctor consultation.

Implementation:

- Timer Functionality: Start and stop timers for contractions.
- Data Analysis: Identify trends like increasing frequency or duration.
- Alert System: Notify users when contractions meet labor criteria (e.g., 5-1-1 rule – contractions every 5 minutes, lasting 1 minute, for 1 hour).
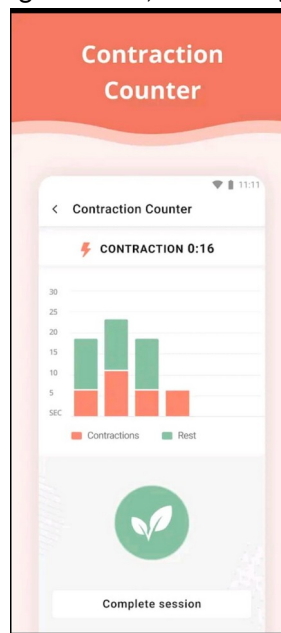
Personal Pregnancy Guide

A Personal Pregnancy Guide in your mobile app can provide expectant mothers with a personalized experience throughout their pregnancy journey. It would act as a virtual assistant, offering tailored insights, health tips, and reminders based on their pregnancy stage.
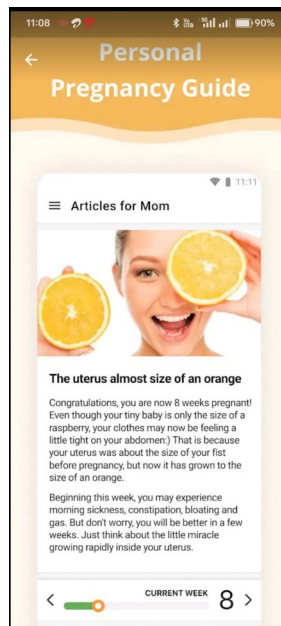
Module 7 :   Anaemia & Hypertension and Nutrition(supplements):

Haemoglobin Level Assessment

Haemoglobin Level Categories:

- o   11 gm/dL
- o   9-10.9 gm/dL
- o   7-8.9 gm/dL
- • Blood Transfusion History: Yes/No
- • Bleeding Disorder History: Yes/No
- • MCV (Mean Corpuscular Volume): [Enter Value]
- • MCH (Mean Corpuscular Haemoglobin): [Enter Value]
- • MCHC (Mean Corpuscular Haemoglobin Concentration): [Enter Value]
- • RDW (Red Cell Distribution Width): [Enter Value]

Mentzer Index Analysis

- • Mentzer Index Level: [Select Level]
- • Iron Deficiency Anemia Diagnosis: Yes/No
- • Other Reports: [Write Notes]

Hypertension and Blood Pressure Monitoring

- • Symptoms Check:
  - o   Headache: Yes/No
  - o   Blurring of Vision: Yes/No
  - o   Epigastric Pain: Yes/No
  - o   Decrease in Urine Output: Yes/No
- • Blood Pressure Levels:
  - o   Systolic BP: [Enter Value]
  - o   Diastolic BP: [Enter Value]

- **Previous Hypertension History:** Yes/No
- **Medication History:** Regular/Irregular

Liver and Kidney Function Reports (LFT & RFT)

- **LFT Report**:

    o   SGOT: [Enter Value]
    o   SGPT: [Enter Value]
    o   Albumin: [Enter Level]
    o   Total Protein: [Enter Level]
    o   Direct Bilirubin: [Enter Level]
    o   Total Bilirubin: [Enter Level]

Our Mobile App screens(Hypertension and Anaemia):

Module 8:   Postnatal Care Module

Requirements:

- Newborn Vaccination Tracker(Infant vaccination scheduler with reminders).
- Breastfeeding Guide & Tips
- Growth tracking and monitoring
- Postpartum Depression Support & Mental Health Screening(Early warning signs of common infant illnesses).

Module 9 :   Telemedicine Module

Requirements:

- Video/audio consultation booking with specialists
- Secure Community chat functionality with healthcare providers
- Document sharing for test results and medical records
- Remote monitoring dashboard for healthcare professionals
- Appointment scheduling and management
- Integration with existing healthcare systems

Module 10:   Healthcare Worker

HealthCare Worker Interface

Requirements:

- Data collection forms for home visits
- Visit planning and scheduling tools
- Case management dashboard for local health workers
- Performance metrics and coverage analysis

- Resource allocation assistance
- Local health facility mapping and referrals
- Health Status Dashboard (Pregnancy statistics, Individual pregnancy journey tracking, high-risk cases)
- Region-wise maternal & infant health reports
- Geographic mapping of health outcomes
- Integration with government health databases

Our Mobile App Dashboard for Health care Worker:

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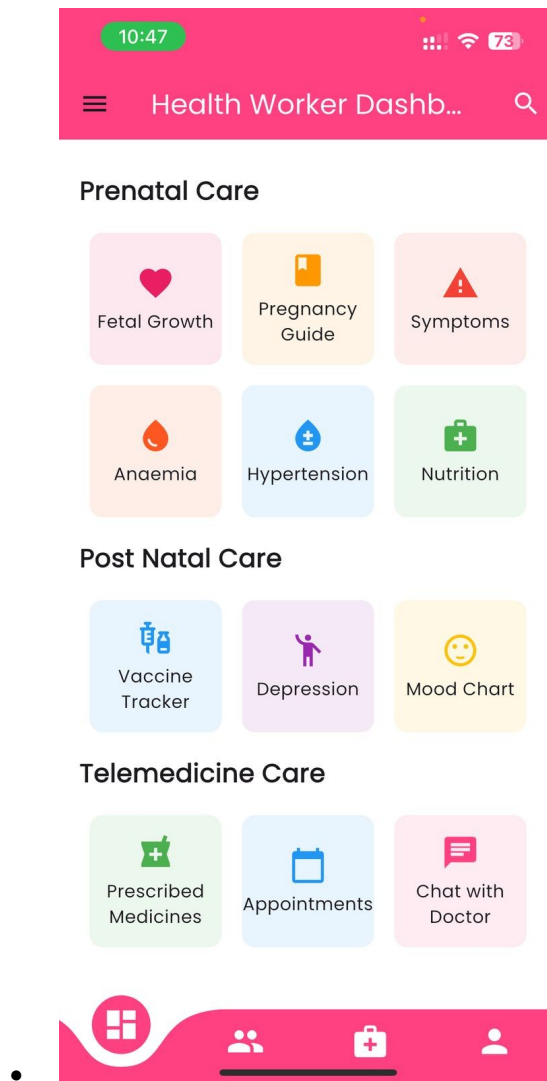
Module 11:

Community Support & User Learning

Requirements:

- Discussion forums for mothers & caregivers
    - o features including a chatbot for all questions, e-books on pregnancy
- Expert Q&A sessions (Doctors, Nutritionists, Midwives)
- Experience-sharing platform for new mothers

Conclusion

Our Maternal Health Monitoring System represents a significant advancement in pregnancy care technology. By combining traditional monitoring methods with cutting-edge portable ECG technology and intuitive mobile interfaces, we're creating a solution that can improve maternal health outcomes while reducing the burden on healthcare systems. We believe this project has tremendous potential to make pregnancy safer and more manageable for women worldwide.