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FANTOMCODE '25

24-Hour National Level Hackathon

Team Name: Team Phoenix

Team Members:

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PROBLEM STATEMENT

- In today's fast-paced world, monitoring personal health and environmental conditions is crucial but often inaccessible.
- Existing health monitoring devices are expensive, bulky, and lack real-time environmental integration.
- Environmental factors like light quality impact mental health, yet there's no affordable, portable solution to monitor both health and environmental data simultaneously.
- Impact: This gap affects individuals' ability to make informed decisions about their well-being, especially in remote or resource-limited settings.
- Anemia affects over 1.6 billion people globally, with 50% of cases due to iron deficiency (WHO, 2023).

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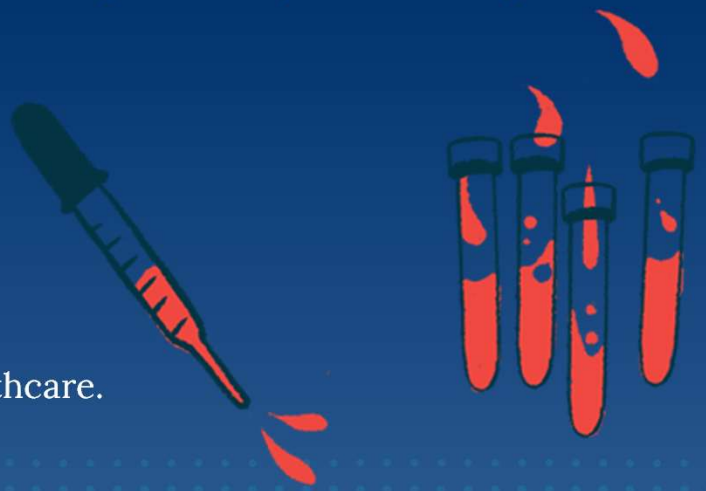
IDEA TITLE

- A portable, non-invasive device to measure hemoglobin levels using optical sensors and machine learning.
- Sensors (AS7262 spectrometer, MAX30102 SpO2 sensor) capture light absorption data through the skin.
- Data is sent via Bluetooth to a mobile app, which uses a machine learning model to predict hemoglobin levels and display results in real-time.
- Benefits:
    - Non-invasive: No needles, no pain.
    - Affordable: Built with low-cost hardware (4000rs).
    - Accessible: Works with any smartphone, ideal for rural healthcare.



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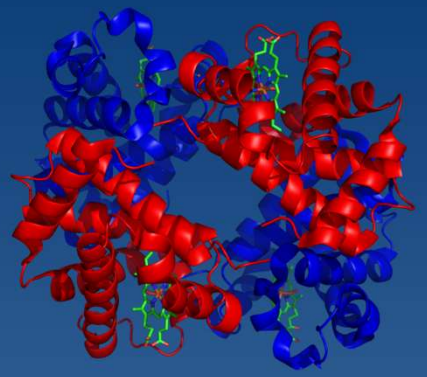
Innovation & Uniqueness:

Integration of ML with PPG Technology – Enhances accuracy compared to existing non-invasive methods.

Real-Time Monitoring & Alerts – Immediate notifications for critical Hb fluctuations.

Cloud-Based Health Tracking – Enables remote health monitoring for doctors and caregivers.

Pre-Anemia Detection System – Uses AI to predict anemia risks before symptoms appear.



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TECHNICAL APPROACH

- Hardware: ESP32-S3-Zero (microcontroller with BLE), AS7262 (spectral sensor), MAX30102 (heart rate sensor).
- Software:
  - Arduino IDE for programming.
  - C/C++ for firmware.
  - Flutter for mobile app development.
  - Frameworks/Protocols: I2C for sensor communication.
  - BLE for data transmission.