CP - 470 Personal Energy Cycle Predictor

Project Charter – Personal Energy Cycle Predictor App

Problem Statement

Most people push through low-energy periods, leading to reduced efficiency and greater fatigue. A smarter approach is an app that predicts personal energy highs and lows, guiding users to schedule demanding tasks during peaks and restorative activities during dips.

Project Objectives

- Collect biometric and activity data from wearables: heart rate, ECG, sleep cycles, skin temperature optional.
- Capture user typing speed and reaction time as measures of cognitive performance.
- Predict personal energy timings through machine learning techniques.
- Generate personalized productivity schedules and advice by using the predictions through LLMs.
- Maximize productivity, decrease fatigue, and raise awareness about personal health patterns.

Stakeholders

- Primary Users: Knowledge workers, students, or anyone looking to maximize productivity.
- Secondary Users: Those conscious about their health tendencies and keep a check on energy, sleep, and stress levels.
- Project Sponsor / Instructor: Oversees project and approves the necessary technical design.
- Development Team
    - Bibek Chugh
    - Kush Jain
    - Akif Rahman

- Yusuf Muzaffar Iqbal
- Tharun Indrakumar

Project Deliverables

Android App (Kotlin/Java, Android Studio):

- Google Fit or manufacturer's API to collect data from a wearable device.
- Capture typing speed and reaction time.
- Compiles user data securely.
- Inform users on best times to study, sleep, workout, etc, based on the predicted energy graph for the day and optionally inform how tasks would affect energy levels after.

UI / Visualization Module:

- Graphs showing trends in heart rate, sleep quality, and predicted energy cycles.
- Daily alerts and notifications for optimal task scheduling and energy inquiries to adjust graphs.

ML Module (TensorFlow Lite):

- Examine biometric and activity data.
- Predict energy highs and lows over the day.

LLM Module (OpenAI GPT-4 / GPT-4-mini):

- Construct individual productivity schedules and suggestions.
- Gives natural language guidance based on ML predictions.

Optional Backend (Firebase):

- Holds historical records and synchronizes them for multiple device use.
- Carries push notifications for reminders on schedules.

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Justification for Project Approval

Importance of Problem:

Energy rhythms: the individual delivery of these rhythms will affect both productivity and health. These are the types of analyses: no existing applications put biometric + cognitive + ML + LLM together to create a schedule optimized for user energy levels.

Technical Difficulties:

- Wearable API integration for heart rate, sleep, and skin temperature, optionally.
- Processing time-series data for prediction of energy through machine learning.
- Automatic generation of reliable, personalized schedules with LLM guidance.
- Development of a user-friendly Android interface with response-graphs and notification features.

High-Quality Software Design:

- This architecture will be modular: Data Collection → ML → LLM → UI → Backend.
- API scaling for several wearables.

Reliability and Usability:

- Google Fit integration provides a very high level of accuracy and standardization in the biometrics collected.
- ML prediction will be tested on multiple users to ascertain robustness.
- The interface shall be designed for intuitive interaction, minimal setup, and easy installation