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Proposal on

THE DEVELOPMENT OF
TrackHer - A PERIOD TRACKING CALENDER

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ABSTRACT

With the help of the programming knowledge and ability we have, this project is presented with the determination of developing a period tracking software that helps track menstrual cycles, predicting ovulation, ultimately helping in reproductive health. The period tracking system is to be developed in C and is going to serve users to track menstrual cycles and symptoms and to make predictions concerning the next menstrual cycle. The application, based on given input data from the user, runs the prediction of cycle algorithm and shares observations on cycle regularity. This program, which we call "TrackHer" introduces the user-interactive interface to the users that will help in understanding their menstrual health, inform the user about their fertility window by adding appropriate data management techniques. The project will include functions of c programming such as CLI, file handling, data management and processing. It also encrypts sensitive data users to maintain privacy. This project highlights a number of uses of C programming in healthcare technologies, integrating file handling, data structures, and algorithmic computation into one project for accurate cycle tracking.

Keywords: CLI, File Handling, encryption, Algorithmic Computation

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List of Abbreviations

Here are the abbreviations used in the document:

CLI – Command Line Interface

GTK – GIMP Toolkit

CSV – Comma-Separated Values

JSON – JavaScript Object Notation

PCOS – Polycystic Ovary Syndrome

FABMs – Fertility Awareness-Based Methods

GCC – GNU Compiler Collection

MinGW – Minimalist GNU for Windows

IDE – Integrated Development Environment

GDB – GNU Debugger

OS – Operating System

1. INTRODUCTION

1.1 Background Introduction

The Period Tracker is a C program using GTK for the GUI and is designed to help users keep track of their menstrual cycles with ease. Upon inputting the last period date, the program predicts the next period start date, calculates the fertile window, and estimates the ovulation day based on the cycles input by users. And with the help of its interactive UI, clear charts and calenders, we intend to make it easy for everyone with least to most resources be able use it.This application is expected to be a very handy tool for anyone who is closely monitoring their reproductive health for some reason, perhaps including personal observation of their own body, future family planning, or addressing specific medical requirements. With an interface that is not just simple but also very interactive, the software gives results that are both quick and precise, thereby standing as a lightweight and very effective alternative to heavier mobile applications that may consume more resources. Furthermore, this app has been properly designed with cross-platform compatibility in mind, enabling users to have a simple way of staying informed about their menstrual health, all within an offline setting that is centered on privacy and personal data security.

1.2 Motivation

The primary motivation for the Period Tracker to exist is that there is an earnest desire for a simple, readily accessible, and privacy-oriented tool solely for menstrual cycle tracking. Numerous period-tracking applications are available on the market that need a persistent internet connection, save personal data on distant cloud servers, or contain extraneous features of minimal value to the majority of users, thus raising serious concerns regarding personal data privacy and security. The prime objective of this project is to present a light and simple-to-use solution that is offline, offering the user a helpful tool that enables them to estimate the time of their next menstrual period, track the process of ovulation, and calculate the precise window in which they are most fertile, while ensuring their privacy intact and in-compromised. Menstrual health understanding is crucial not just for maintaining reproductive health but also for

prudent general health management. Therefore, this tracker is a useful companion for users who seek an effective, simple, and trustworthy means to track their menstrual cycles and related health indicators closely. With the utilization of the extremely potent programming language C and the remarkably versatile graphical toolkit GTK, the program is able to deliver amazing and high-speed performance. This aspect ensures that it has no issues running flawlessly on various platforms, which further renders it a highly handy tool amongst users utilizing various operating systems.

1.3 Problem Definition

Tracking the menstrual cycle is important for users to monitor their reproductive health, plan for pregnancy, or manage health issues like PCOS or irregular periods. The majority of available period tracking applications are internet-dependent, data-intensive, and privacy-invading in the sense that they store sensitive health data on cloud servers. Also, users may feel overwhelmed by feature-rich applications when they need just basic tracking features.

The app named **TrackHer** tries to solve this problem by offering a **lightweight, offline, and privacy-oriented** app that allows users to track their menstrual cycles with ease. The app lets users enter the date of their last period and then calculates the next period start date, fertile window, and ovulation day based on a typical 28-day cycle model. Developed with C and GTK, the application provides speedy performance, cross-platform compatibility, and user-friendliness while minimizing the risk of exposing personal health information. Consequently, this project offers a straightforward, secure, and efficient means of managing menstrual care.

1.4 Objectives

The objectives that our project aims to serve at its completion are:

- Develop a user-friendly, offline, and secure GUI application using C and GTK to help individuals efficiently track their menstrual cycles while ensuring data privacy.

- Implement period prediction based on user input and enhance usability with an interactive graphical interface, making it a lightweight, cross-platform tool.

1.5 Scope and Applications

The Period Tracker is a lightweight and privacy-focused menstrual cycle tracking application developed using C and GTK. It allows users to predict their next period, fertile window, and ovulation date based on their last period entry. Unlike many online period trackers, this software operates completely offline, ensuring user data privacy. It serves as a useful tool for personal health monitoring, family planning, and medical consultations. With a simple and interactive GUI, the application provides an efficient and accessible way to track menstrual health while being cross-platform compatible and expandable with additional features in the future.

2 LITERATURE REVIEW

Following the awareness created about menstrual health of woman, there are plenty of application software as such available on the market, Similarly, this has followed a plenty of research on the topic. The following is an outline of current research and developments in this area:

2.1. Fertility Awareness-Based Methods (FABMs)

What is the research?

FABMs are systems used to track fertility and menstrual cycles for the purpose of family planning. They are systems that track basal body temperature, cervical mucus, and menstruation dates.

How is it done?

Daily observations are recorded manually by users and algorithms are used to predict fertile windows. Others also use wearable devices to track physiological changes.

Importance/Applications:

FABMs are a non-invasive and natural way of fertility control and planning pregnancies.

Weaknesses/Limitations:

Requires regular and accurate input of data, which can be cumbersome for users. Effectiveness is lost with irregular cycles or external influences.

Criticisms:

User input can be erroneous and inconsistent. FABMs are criticized by some as being less effective compared to other forms of contraception.

Minimizing the constraints of manual entry and maximizing accuracy can serve as an impetus towards creating a more automated and user-friendly application for tracking menstrual cycles.

2.2. Smartphone-Based Period Tracking Applications

What is the work?

Smartphone apps that monitor menstrual cycles and forecast fertility periods based on user-inputted information and computational calculations.

What methods are used?

Users input start and end dates of periods, and the apps utilize algorithms to predict future cycles and fertile windows. Few also use machine learning to further refine forecast accuracy with time.

Significance/Uses:

Convenient and available method for users to track menstrual health and plan pregnancies.

Limitations/Weaknesses:

Privacy, data protection, and prediction accuracy are aspects that can differ significantly. Some apps may not account for irregular cycles or particular medical conditions.

Criticism:

Critics argue that prediction accuracy can be variable, and there is no standardization between different apps.

Link to Motivation:

Improving the accuracy and consistency of predictions could be a strong driver for the development of a more reliable period monitoring app.

2.3. Menstrual Health via Wearable Technology

What does the research involve?

Wearable technologies to track physiological changes that are characteristic of menstrual cycles, such as temperature and heart rate.

What is the employed methodology?

Devices continuously monitor physiological data and use algorithms to predict menstrual cycles and fertility windows. Some devices provide real-time feedback and data.

Importance/Applications:

Provides a more mechanized and accurate way of monitoring menstrual health and fertility.

Drawbacks/Limitations:

Wearable devices are expensive and may not be accessible to all users. Accuracy of data remains vulnerable to external factors.

Criticism:

Critics also point out that wearable devices are not a necessity for all and can be seen as an additional expense.

Relation to Motivation:

Developing an affordable and accessible product that combines the benefits of wearable technology and smartphone apps can be a strong motivation.

2.4 Conclusion

Current literature on period tracking apps has come a long way in advancing menstrual health management. Yet, there is still room for enhancement, particularly in the areas of accuracy, accessibility, and standardization. These weaknesses could be the driving factor for creating a more accurate and user-friendly period tracking app.

3 PROPOSED SYSTEM ARCHITECTURE

3.1 Block Diagram/ System Architecture

The tracker calendar is proposed to have a User-Interactive Interface with the use of GUI and GTK within the application. The architecture the system will follow is presented as:

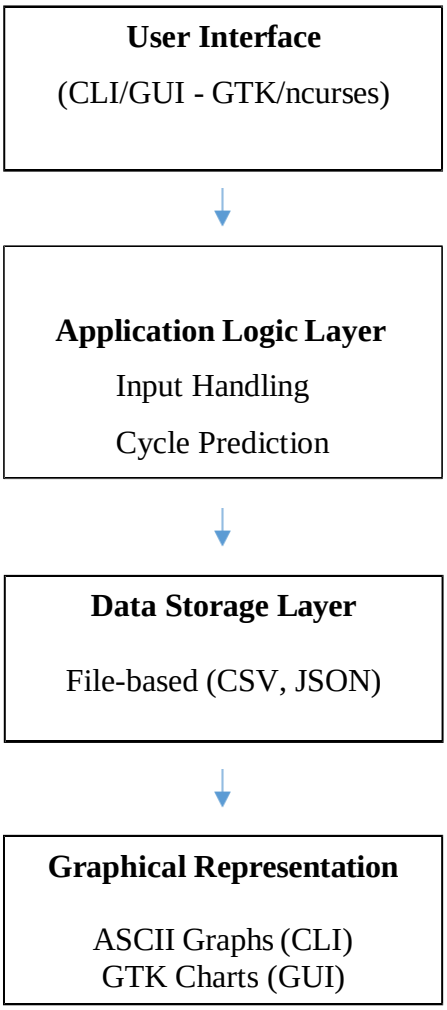


Fig 3.1: Basic system architecture

3.1.1 Presentation Layer (UI)

The application provides user interaction features, allowing users to track their menstrual cycles, view a calendar, access cycle logs, and analyze trends through analytics. The user interface can be either a terminal-based CLI application or a GUI-

based interface using libraries like GTK or ncurses. It consists of several key components, including a *Main Menu* that offers options to log data, view records, and adjust settings. The *Calendar View* displays period dates, while the *Cycle Analysis* section presents charts and statistical insights.

Su	Mo	Tu	We	Th	Fr	Sat
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Fig 3.2: Cycle Calendar

3.1.2 Application Layer (Logic)

The Application Layer layer is a logical layer that manages user input and processes data to ensure accurate period tracking. It handles predictions and cycle calculations, implementing core period tracking algorithms. The main components of this layer include the *User Input Handler*, which processes logs entered by the user. The *Cycle Predictor* analyzes past data to estimate future menstrual cycles, while the *Symptom & Mood Tracker* allows users to log additional health-related details.

3.1.3 Data Layer

The Data Layer (Storage) is responsible for managing local or external storage of user data. The application can use file-based storage (e.g., CSV, JSON, or binary files) for simple implementations or a database like SQLite for structured data management. Key components include User Data Storage, which logs period start and end dates, Cycle Data Storage, which keeps track of previous menstrual cycles, and Settings Storage, which saves user preferences and configurations.

3.1.4 Graphical Representation Module

The Graphical Representation Module enhances user experience by visualizing menstrual cycle trends and predictions. It can generate ASCII-based charts for CLI interfaces or use GTK/cairo-based visualizations for GUI applications. This module consists of several key components, including Bar Charts, which represent menstrual duration over different months, Line Graphs, which show variations in average cycle lengths, and Pie Charts, which provide insights into symptom tracking. Additionally, the Calendar Heatmap highlights cycle patterns, making it easier for users to identify trends over time.

3.2 Data Flow Diagram

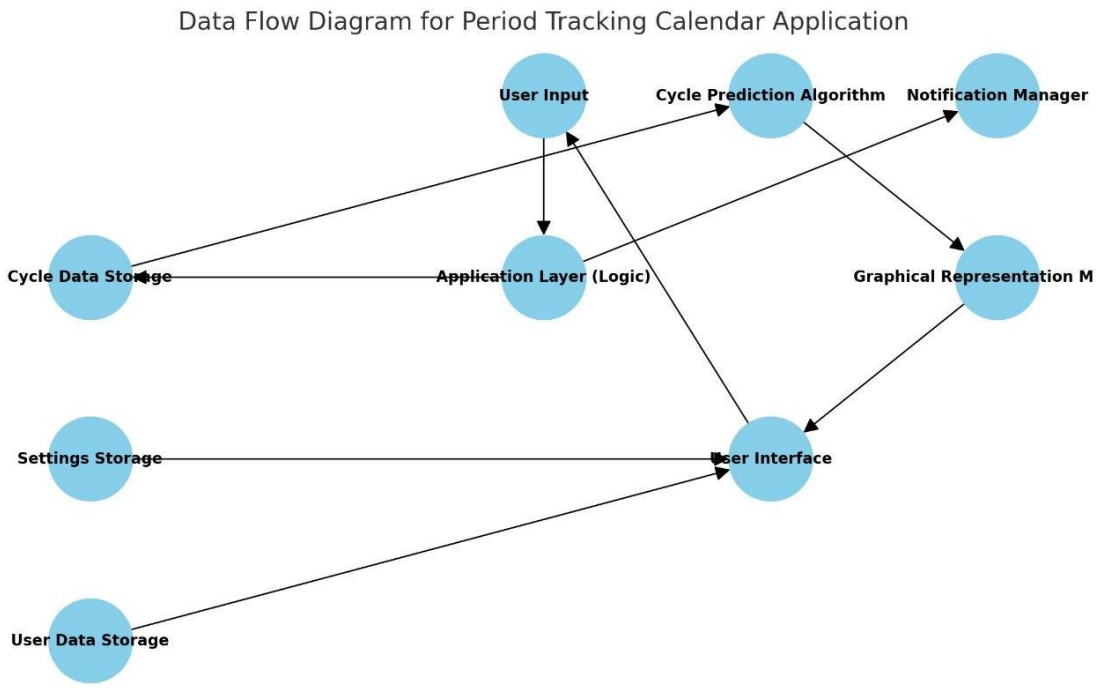


Fig 3.3 data flow diagram

In this system, the User Input initiates the process by providing data to the Application Layer (Logic). The Application Layer processes this input and stores it in the Cycle Data Storage. The Cycle Prediction Algorithm then utilizes this stored data to make cycle predictions, which it sends to the Graphical Representation Module for visualization. The User Interface displays the processed data to the user. Additionally, the Notification Manager triggers alerts based on user data and settings, while the

Settings Storage and User Data Storage manage user preferences and basic data, respectively.

3.3 Tools and Environment

Compiler: GCC (Linux), MinGW (Windows)
IDE/Text Editors: Code::Blocks, VS Code, Vim
Debugger: GDB for C

Libraries & Frameworks
UI: ncurses (CLI), GTK (GUI)
Storage: SQLite for structured data, JSON/CSV for lightweight storage
Graphics: ASCII Art for CLI, GTK/cairo for GUI charts

Operating System & Deployment
Supported OS: Linux, Windows, macOS
Deployment: Local application, no internet required

4. METHODOLOGY

The development of TrackHer: A Period Tracking Calendar follows a structured methodology to make it accurate, efficient, and user-friendly. Development will be carried out in multiple phases that include requirement analysis, system design, implementation, testing, and deployment. Every step will be duly planned to develop a lightweight and privacy-oriented menstrual tracking application.

4.1 Requirement Analysis

The functional and non-functional requirements of the system are identified in this process. The application should be able to allow users to track their menstrual cycles, predict the next period, estimate ovulation and the fertile window, and provide a user-friendly GUI for easy interaction. The data security and privacy are also crucial; it should ensure that all user data is kept offline and encrypted. Nonfunctional needs

shall include cross-platform compatibility, lightweight, and efficient data management. C is the selected programming language for speed and efficiency, complemented by GTK for building a graphical interface. The file-based storage application shields user data in a private way using TXT, CSV, or JSON.

4.2 System Design

The application is structured into three layers: presentation, application, and data. The presentation layer provides a user-friendly GUI using GTK for input and visualization. The application layer handles menstrual cycle tracking, predictions, and symptom logging. The data layer ensures secure local storage using structured formats like CSV or JSON with encryption to protect user data.

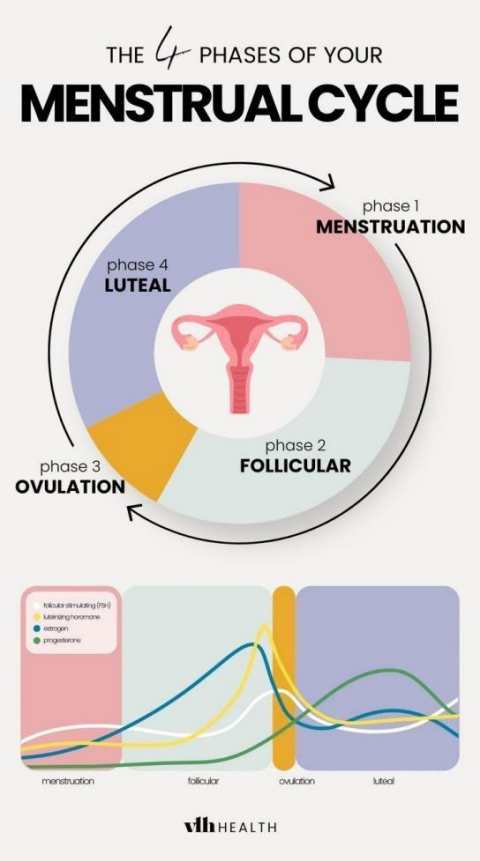


Fig: 4.1 phases of a menstrual cycle

4.3 Implementation Phase

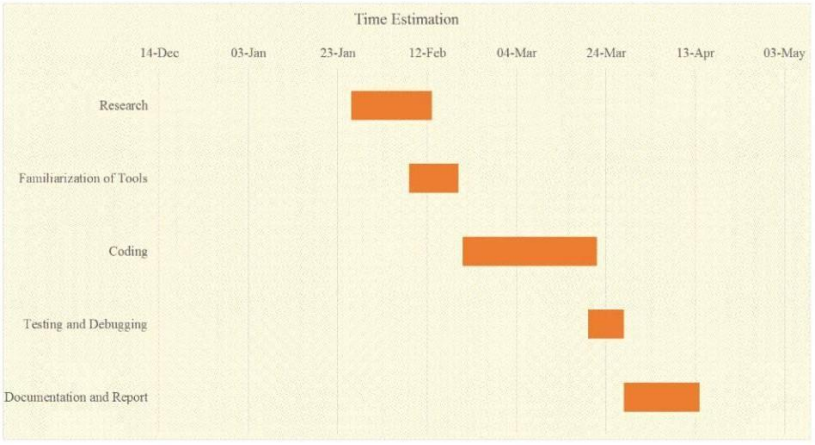
The application development is done by using C along with GTK; the steps carried out are systematic. First of all, it creates a development environment with installed libraries. Secondly, it works on GUI to make it as user-friendly and interactive as possible. It covers the central ideas of cycle tracking and prediction for ovulation, followed by handling files for locally storing the information. Under these, all those security-related concepts are accommodated, encryption methods to secure privacy. After performance optimization that gives smooth results under different OS versions.

4.4 Testing and Debugging

The application goes for Testing and Debugging in order to check its functionality, usability, and security. Unit testing is done on individual modules, including data input, storage, and retrieval, while integration tests are directed to ensure that there is no malfunction between different parts. A test of the graphic interface, allowing end-users to comfortably interact with it, and security checks, to show whether the encryption and privacy functionalities work correctly.

TrackHer follows this structured methodology to ensure that menstrual cycle tracking is secure, efficient, and user-centric, giving priority to data privacy while offering an accessible and interactive experience for users.

5 TIME ANALYSIS



6 FEASIBILITY ANALYSIS

6.1 Technical Feasibility

The application can be developed using C with ncurses for a CLI or GTK for a GUI. While the CLI version is straightforward, the GUI implementation requires additional effort for interface design and user experience improvements.

6.2 Economic Feasibility

The project is cost-effective as it relies on open-source tools, eliminating licensing fees and reducing development costs.

6.3 Operational Feasibility

The application meets user needs by providing menstrual tracking, predictions, and analytics, making it highly practical for personal health management.

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