Senior Project Proposal

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Problem Statement

Many individuals aim to manage their health through improved nutrition, whether for weight management, athletic performance, or general wellness. In an ideal state, users would be able to easily track daily calorie intake, understand how food choices align with personal goals, and observe measurable progress over time through a clear and intuitive system. Tracking would be simple, efficient, and sustainable as part of a daily routine.

However, existing calorie tracking applications are often cluttered with excessive features, complicated interfaces, or subscription-based restrictions that reduce accessibility. Research in behavioral health and habit formation suggests that overly complex systems increase cognitive load and reduce long-term adherence to tracking behaviors. When users find applications overwhelming or time-consuming, they are more likely to discontinue use, ultimately undermining their health goals. Given that consistent self-monitoring is strongly associated with improved weight management outcomes, the lack of a streamlined and user-centered tracking solution presents a meaningful gap.

This project proposes the design and development of a web-based calorie tracking application that prioritizes simplicity, usability, and workflow clarity. The solution will allow users to record meals, view daily calorie totals, and monitor basic trends through a clean interface without unnecessary complexity. By reducing friction in daily nutrition logging, the proposed system aims to promote consistency and long-term engagement. In summary, this project addresses the usability limitations of current calorie tracking tools by designing a simplified and accessible system that supports sustainable health monitoring.

Project Description

This project involves the design and implementation of a web-based calorie tracking application. The system will allow users to:

- Create and manage personal accounts

- Log daily food intake with associated calorie values

- View total daily calorie consumption

- Monitor calorie trends over time

- Set basic calorie goals

- Visualize progress through graphical representations

The application will follow a client-server architecture with a frontend interface communicating with a backend API connected to a relational database. Emphasis will be placed on usability, structured data storage, and clear visual feedback.

The final deliverable will include a functional prototype, documented system architecture, database schema, API documentation, and a formal presentation.

Proposed Implementation Language(s)

- Frontend: JavaScript (React.js)

- Backend C# (.NET Web API)

- Database SQL (SQL Server)

Libraries, Packages, Development Kits

Frontend

- React.js

- Chart.js

- Axios

Backend

- [ASP.NET](ASP.NET)

- Entity Framework Core

- JWT Authentication

Database

- Microsoft SQL Server

Developmental Tools

- Visual Studio

- Visual Studio Code

- Github

Additional Software/Equipment Needed

- Development computer capable of running VSC and SQL Server

- Local web server environment

- Github repository

- Internet access

No specialized hardware is required

Alternative Solutions and Rationale

Alternative solutions include:

1. Developing a mobile application instead of a web application.

2. Integrating third-party nutrition databases (e.g., API-based food lookup).

3. Using a full-stack JavaScript solution (Node.js backend instead of .NET).

The chosen approach (React frontend with .NET backend) was selected because it aligns with coursework experience and strengthens backend API development skills. A web-based application ensures accessibility across devices without requiring mobile platform-specific development. Additionally, limiting integration with external food APIs maintains project scope and emphasizes core system design rather than data sourcing complexity.

Personal Motivation

This project aligns with both academic and personal interests in health technology and software usability. Developing a calorie tracking system will strengthen knowledge in full-stack development, database design, API construction, and user-centered interface design.

Additionally, this project provides practical experience in designing systems that address real-world behavioral challenges, particularly in habit formation and user engagement. By completing this project, the student will enhance skills in structured system architecture, data modeling, and scalable web application development, preparing for professional software engineering roles.

Outline of Future Research Efforts

To complete this project, the following steps will be taken:

1. Conduct research on user interface best practices for habit-forming applications.

2. Analyze existing calorie tracking systems to identify usability gaps.

3. Design system architecture diagrams and database schemas.

4. Implement backend API endpoints for user management and calorie logging.

5. Develop frontend components and integrate them with backend services.

6. Perform system testing and debugging.

7. Conduct usability evaluation and refinement.

8. Prepare final documentation and presentation materials.

Expected deliverables include:

- Functional prototype

- System architecture diagram

- Database schema diagram

- API documentation

- Final written report

- Presentation/demo

CSCI 498 (Senior Project I)

Date	Task
Week 1–2	Finalize proposal and requirements
Week 3–4	System architecture and database design
Week 5–6	Backend API development (core endpoints)
Week 7–8	Initial frontend implementation
Week 9	Integration testing
Week 10	Mid-project review with advisor

CSCI 499 (Senior Project II)

Date	Task
Week 1–3	Feature completion and refinement
Week 4–6	Graph visualization implementation
Week 7	System testing and debugging
Week 8	Documentation completion
Week 9	Final presentation preparation
Week 10	Project demonstration and submission