BRAUDE
College of Engineering, Karmiel

Capstone Project Phase A

25-1-D-5

ParkinSphere

Development of an Application for Multidisciplinary Care Management and Support for Parkinson's Disease

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AGENDA

1. **Project Overview**
   Introduction, Parkinson’s Disease and Multidisciplinary Care Management ,Analyze problem and Related Work.

2. **Project Details**
   Project Goals and User-Centered Design.

3. **Technical Aspects**
   Project Unique Features, System Design: Architecture, Use Cases, and Prototypes, Expected Achievements and Evaluation & Verification.

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INTRODUCTION

PARKINSON'S DISEASE OVERVIEW

1

Parkinson's disease (PD) is a progressive condition affecting motor and cognitive abilities, causing tremors, stiffness, and slowed movements.

Patients alternate between "ON" states of better function and "OFF" states of worsened symptoms.

Effective daily management is crucial as there is no cure.

ANALYZE PROBLEM

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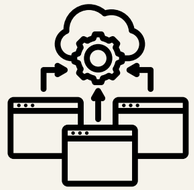


Care providers rely on non-integrated sources, limiting comprehensive assessments.

Physiotherapists, nutritionists, and trainers lack tools tailored to their unique data requirements.

Ensuring secure access while allowing patient control remains a challenge.

RELATED WORK

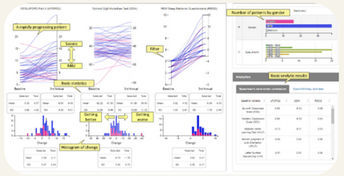
EXISTING SOLUTIONS

1

We reviewed Epic's Care Everywhere, T1D Exchange Registry, Winnow, and OnPoint Visualization Tool:

Epic's Care Everywhere

T1D Exchange Registry



Winnow: Interactive Visualization

OnPoint Visualization Tool

They offers:

- ✓ broad access to general patient data across institutions
- ✓ custom data views and trend tracking for specific conditions
- ✓ interactive visualizations for tracking clinical progression

They Don't offers:

- ⊗ dashboards tailored to individual care provider needs
- ⊗ user-friendly for diverse roles in multidisciplinary teams
- ⊗ solutions for handling unique data visualization and care coordination requirements for Parkinson's disease.

2

PROJECT GOALS

ParkinSphere : A technological solution

- User-Friendly Platform
- Role-Based Dashboards
- Secure Data Sharing
- Detailed Data Visualizations
- Clear Text Explanations
- Annotation and Notes Features
- Custom Timeframes

USER-CENTERED DESIGN

Building on Insights

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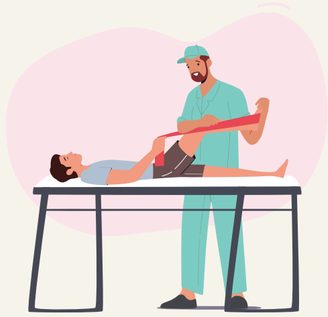
Our project continues the foundation established by the previous initiative, leveraging their user interviews:

Parkinson's Patients: Insights into daily challenges and data needs.

Care Providers: Identified workflow requirements and visualization preferences.



USE CASE DIAGRAM

How ParkinSphere Works

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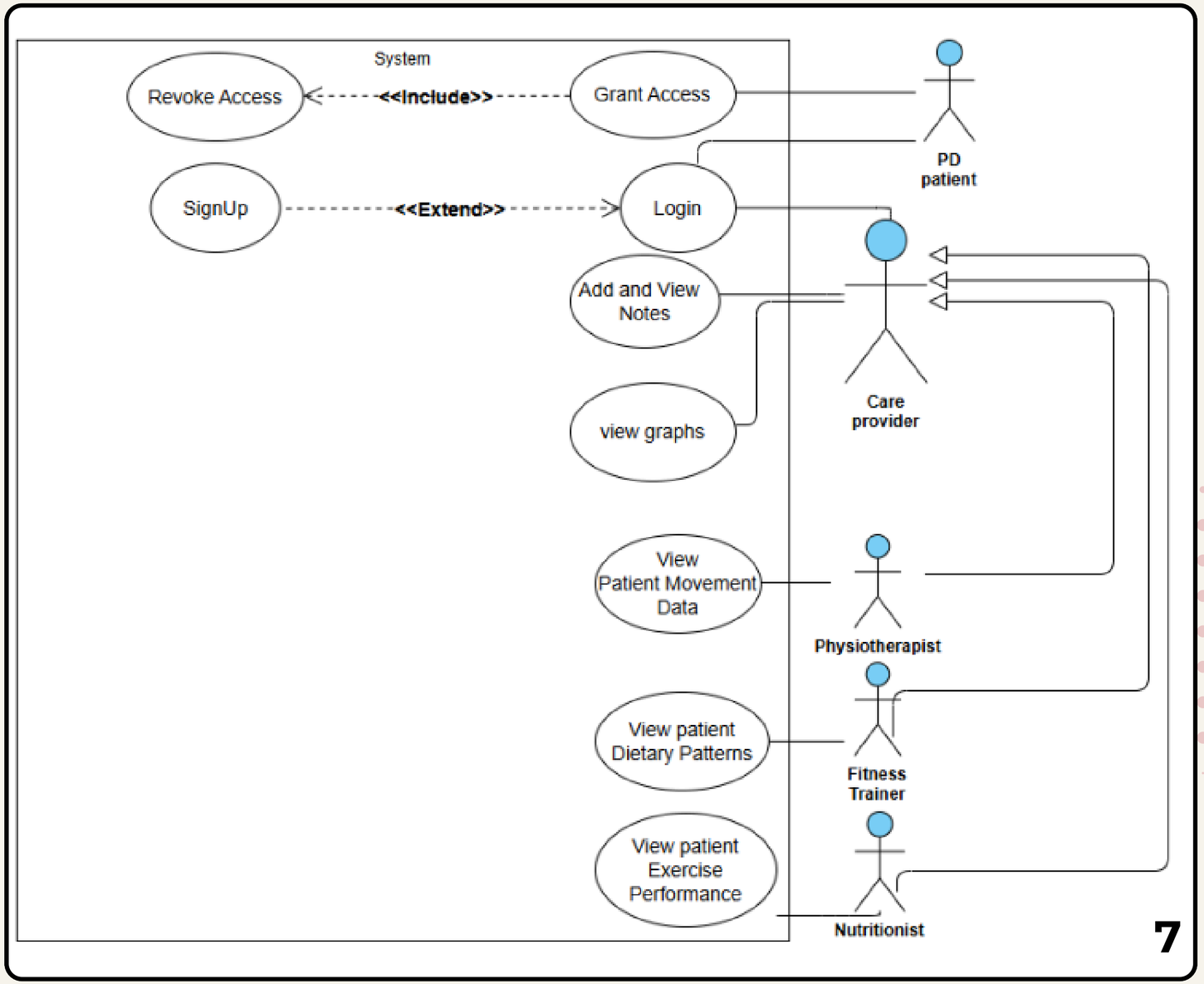
This diagram shows how Parkinson's patients and Care Providers interact with the app.



SYSTEM ARCHITECTURE

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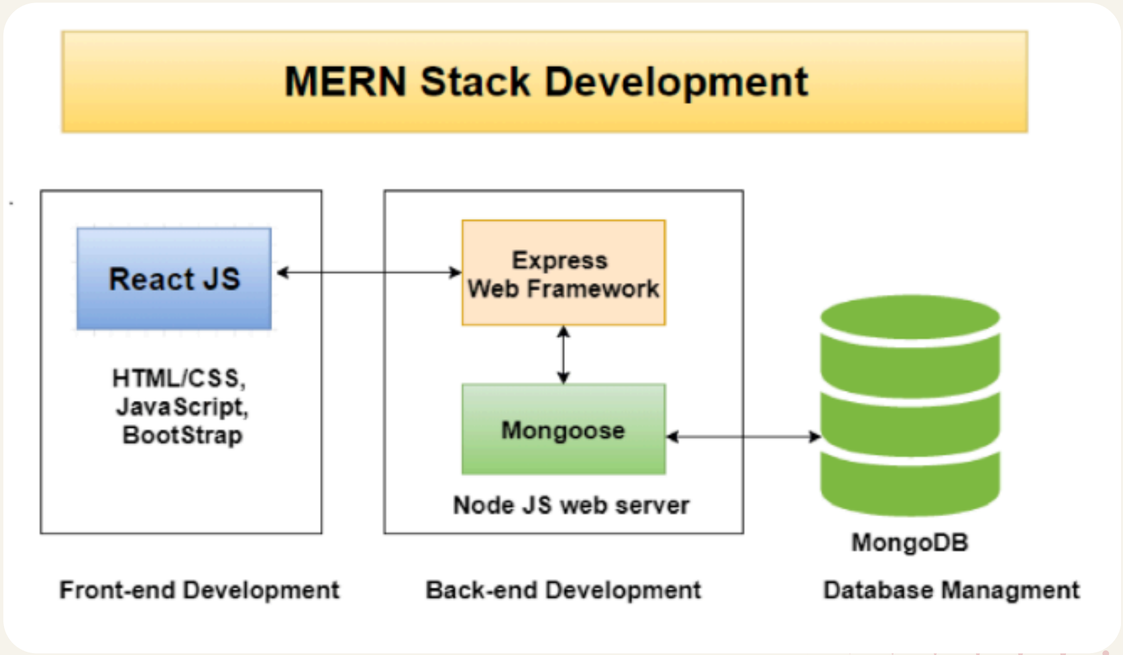
Technical Overview

The application will be built using the MERN stack (MongoDB, ExpressJS, React, and Node.js).
The system is a web-based solution that is accessible from multiple devices, enabling care providers to view patient data, track trends, and make informed decisions.



PROJECT VISUALIZATION CHOICES

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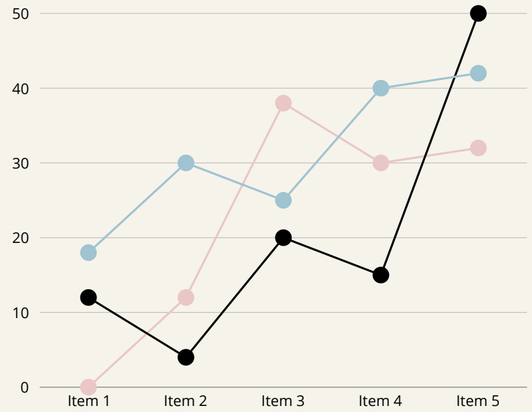
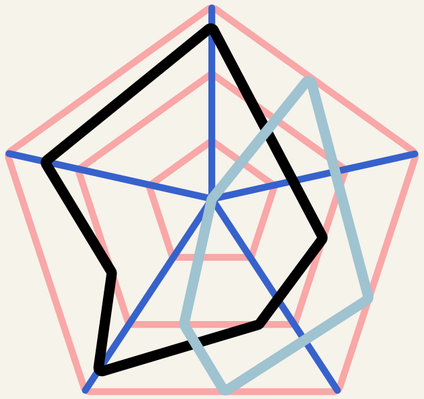
Line Charts



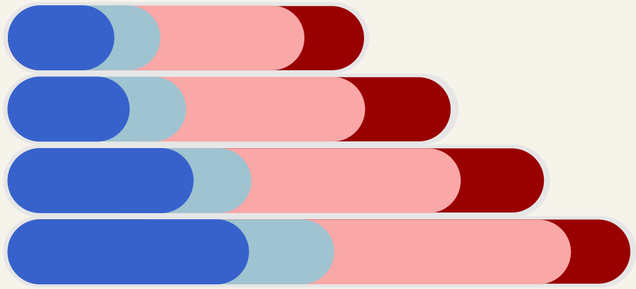
Track trends over time, highlighting patterns like symptom progression

Radar Charts



Summarize multiple metrics in one view, ideal for tracking fitness progress.

Stacked Bar Charts



Display cumulative data like weekly exercise outcomes or nutrient intake.

PROJECT VISUALIZATION CHOICES

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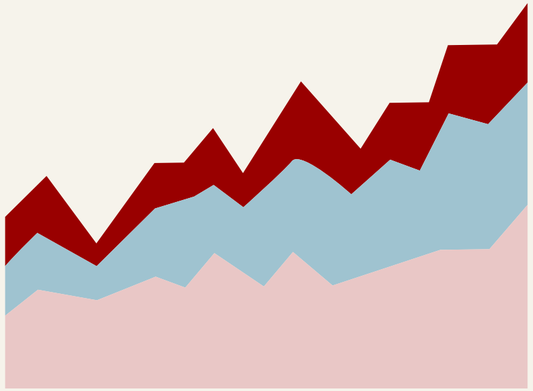
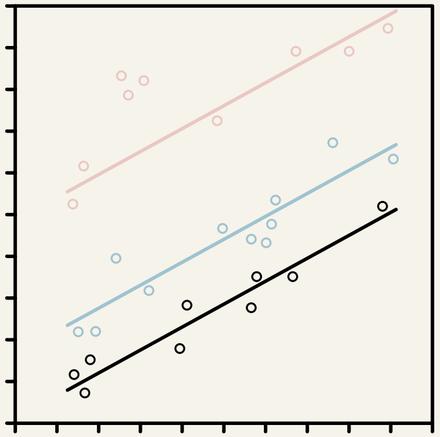
Area Charts



Illustrate cumulative trends, such as changes in overall health metrics or exercise outcomes over time.

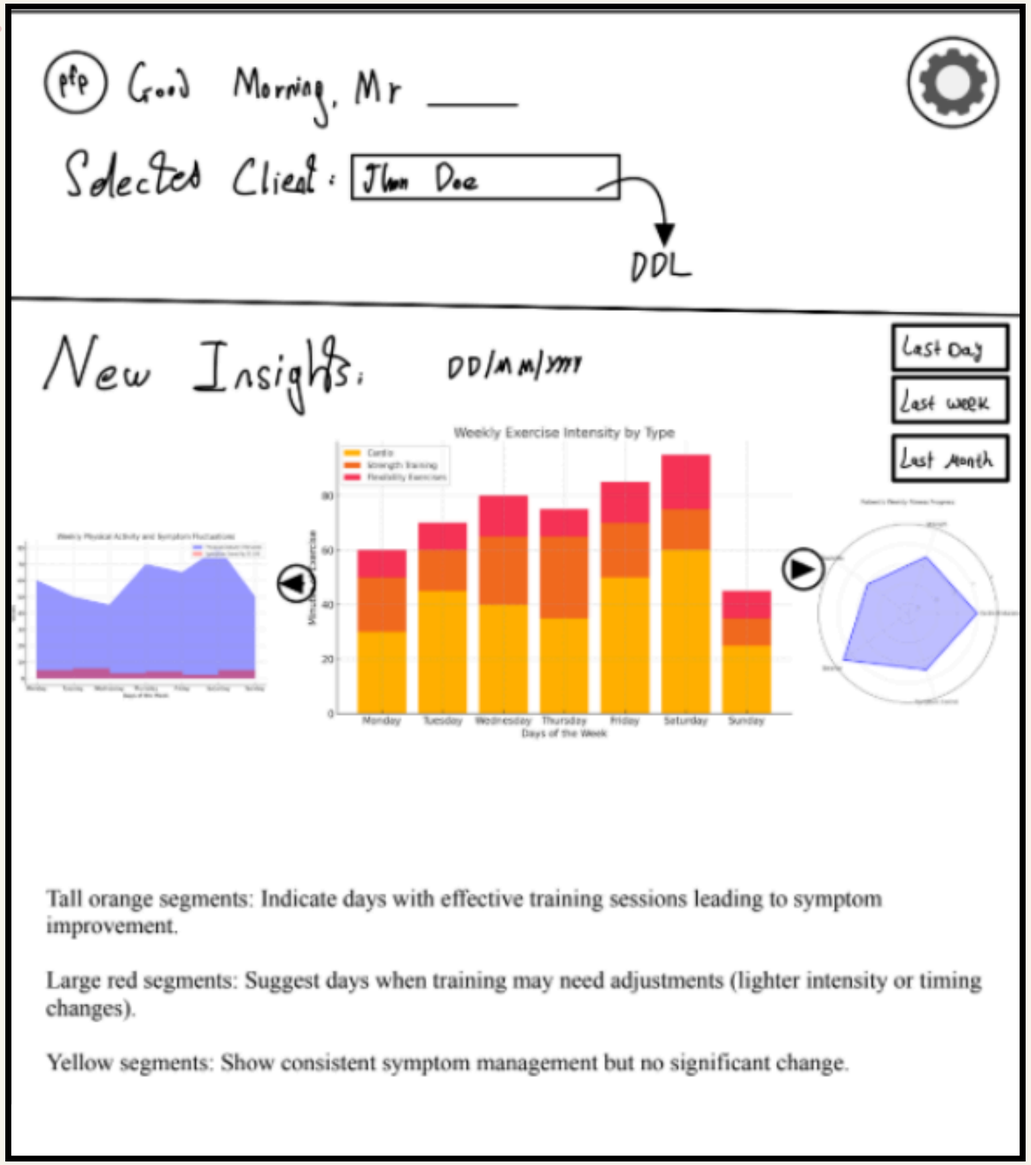
Scatter Plots



Show relationships between variables, such as activity levels and symptoms.

PROTOTYPE SCREENS

The Fitness Trainer Dashboard



Fitness Trainer Data Needs:

Pre-Training Condition

Post-Training Assessment

Fitness Levels & Training Outcomes

Symptom Changes Linked to Exercise

Meal Timing for Energy Optimization

PROTOTYPE SCREENS

The Physiotherapist Dashboard

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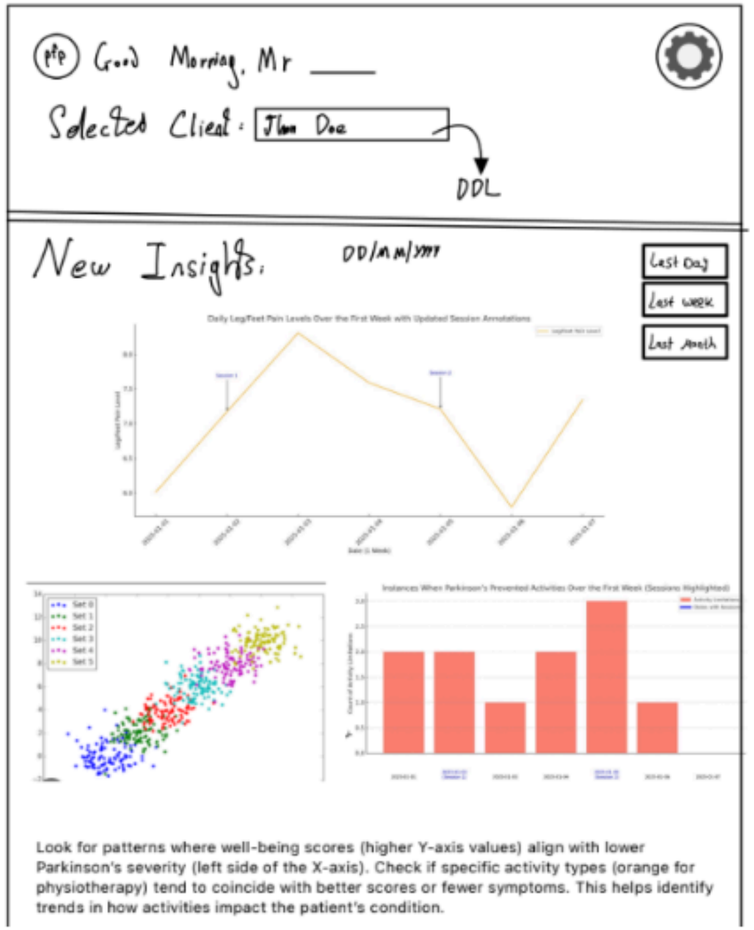
The Physiotherapist Dashboard:

Helps physiotherapists monitor symptom severity, general well-being, and physical activity patterns. Data resolution can be adjusted for a day, week, or month.



Physiotherapist Data Needs:

Pain & Fatigue Monitoring

Impact of Therapy on Mobility

Tracking Movement & Symptoms Over Time

Long-Term Progress Tracking

PROTOTYPE SCREENS

The Nutritionist Dashboard

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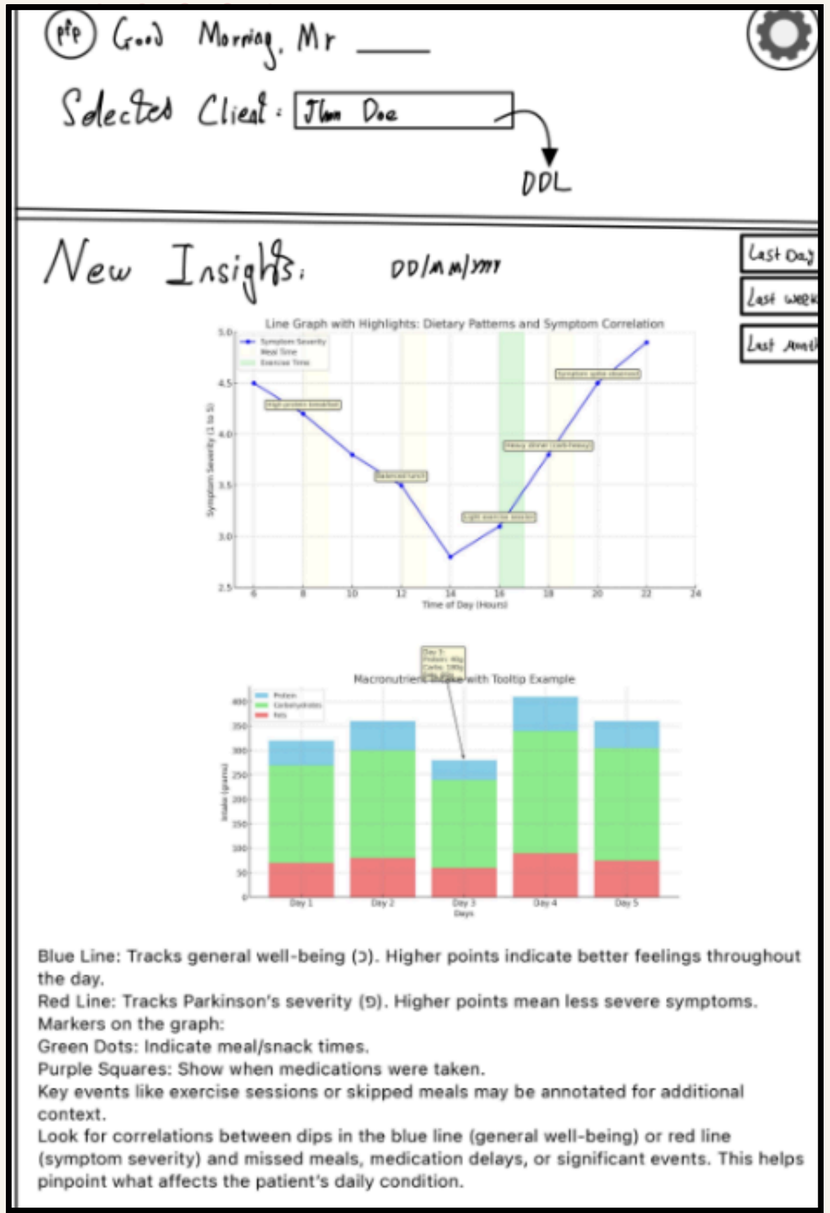

Nutritionist Data Needs:

Meal & Medication Timing

Nutrient Breakdown

Symptom & Diet Correlation

Hydration & Energy Levels

PROTOTYPE SCREENS

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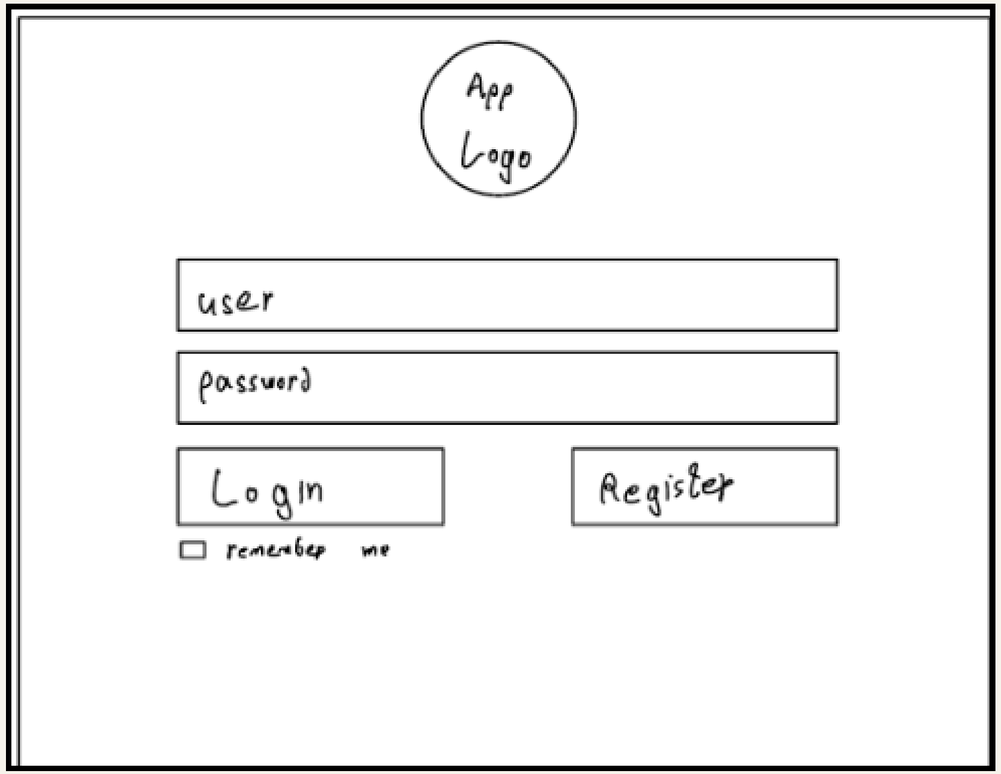
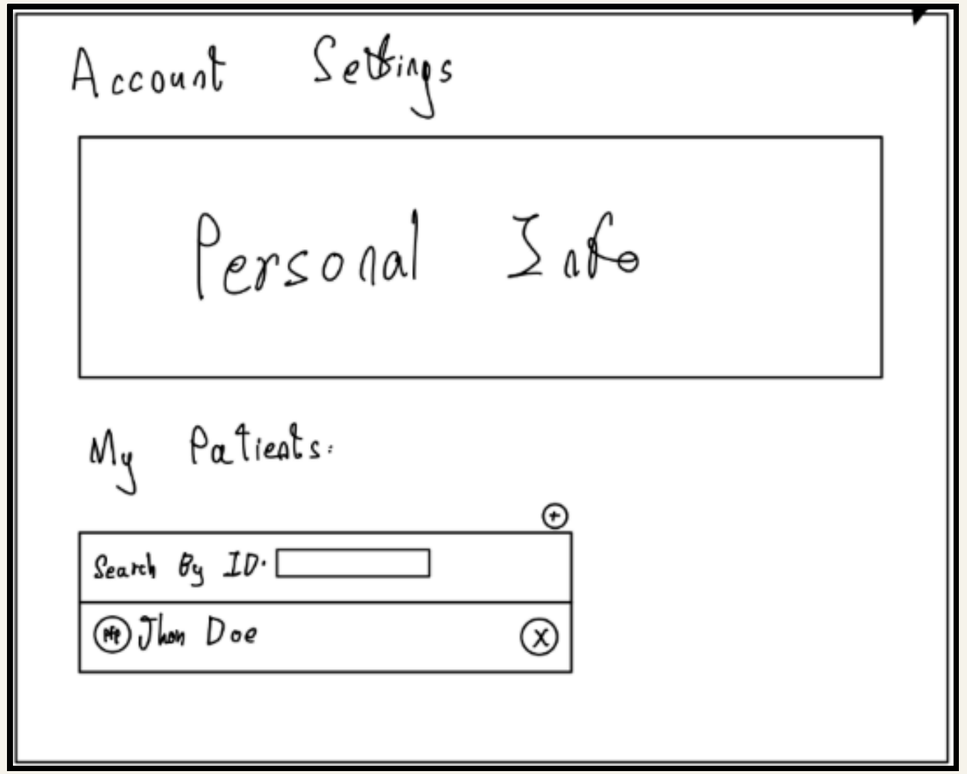
Prototype Screenshots of the App

Shared Screens for Care Providers:

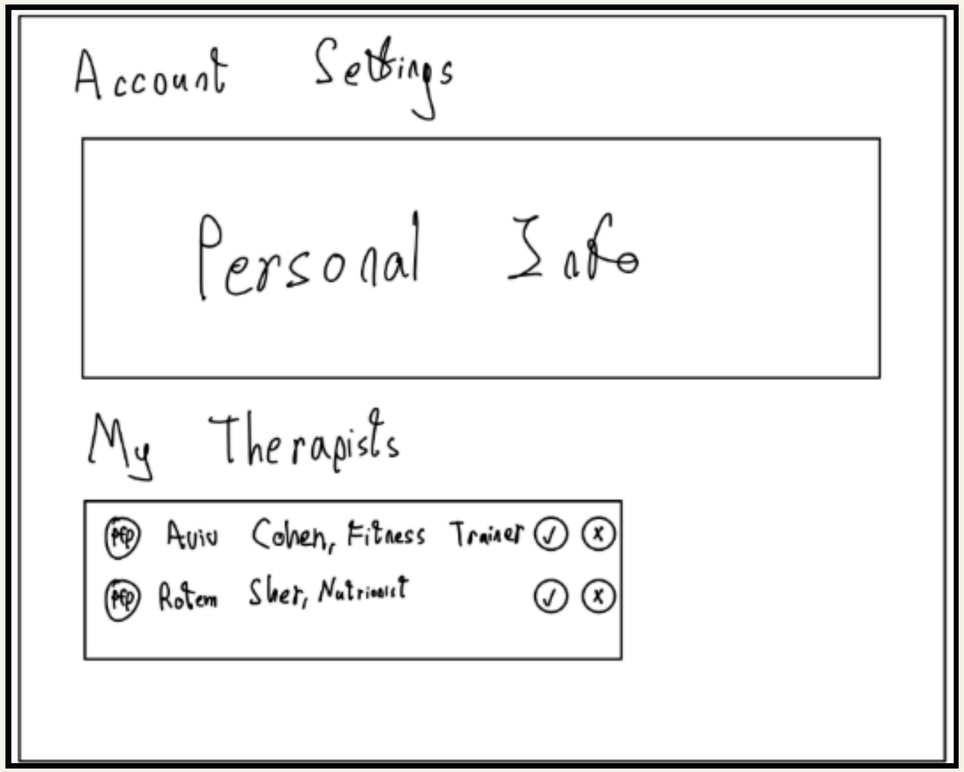


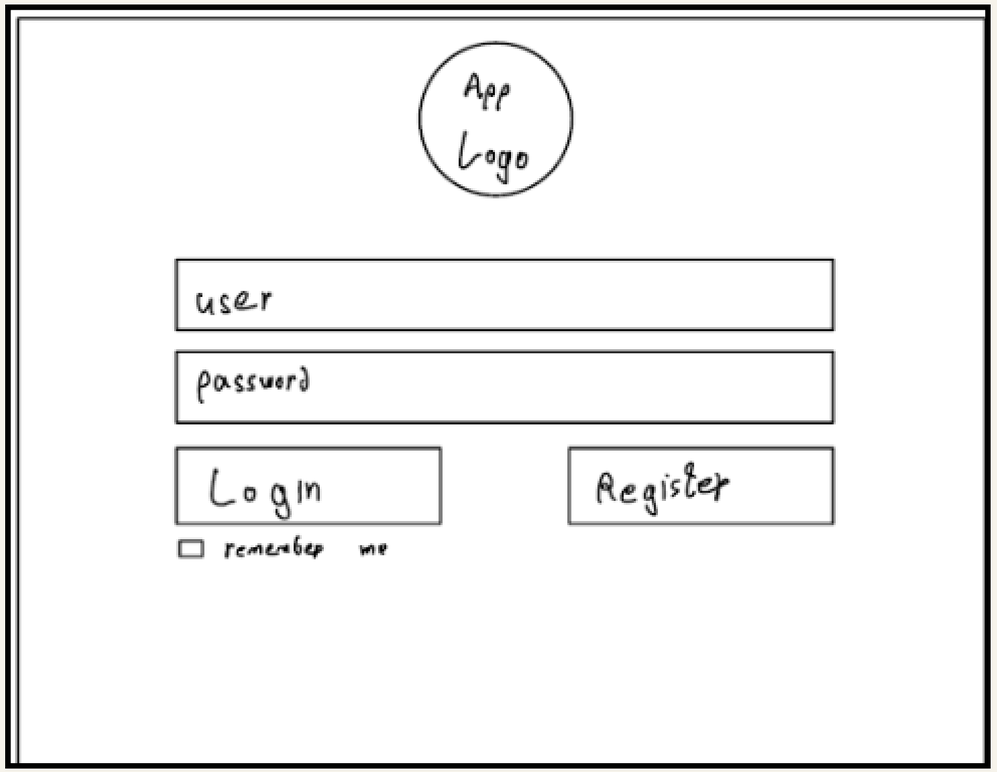


PROTOTYPE SCREENS

Prototype Screenshots of the App

Parkinson’s patient screens:





EXPECTED ACHIEVEMENTS

Project Outcomes

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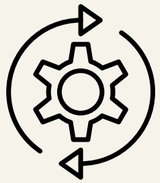

Optimized Workflow

Reducing time spent on manual data interpretation through automated and insightful visualizations.

Early Trend Detection

Helping care providers identify emerging patterns in patient data for timely intervention.

Stakeholder Validation

Ensuring the platform meets the practical needs of care providers through direct feedback.

Evaluation & Verification

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🔹 **Testing Plan**

✔️ User registration & login
✔️ Role-based access & security
✔️ Data visualization & performance (<3s load time)
✔️ Mobile responsiveness

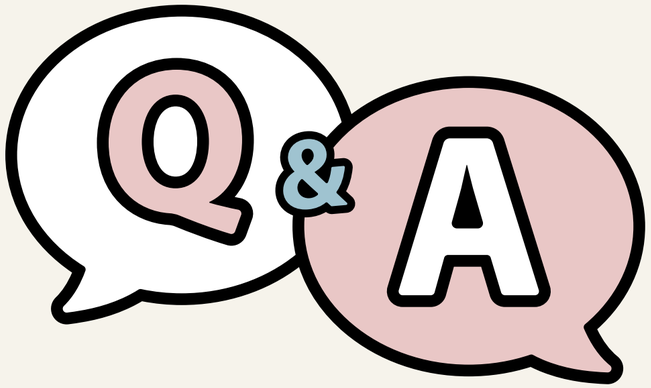
🔹 **User Evaluation**

👤 Care Providers – Analyze trends, review data, annotate progress
👥 Patient – Manage access, verify security

🔹 **Success Metrics**

✅ SUS Score: 85+
✅ Task Completion: 95%+
✅ Performance: <3s load time
✅ Security: 0 unauthorized access

THANK YOU!



Feel free to ask any question