טכנולוגיות אינטרנט מתקדמות - 61776 (WEB)

הגשת פרויקט

<Carebells> < B22><18>

שם חבר.ת הצוות	תז
לאון פלדמן	207434879
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כיאן גדבאן	211613708
עומרי עבדאללה	323964817

קישור לגיט: https://github.com/Leontarin/CareBell
קישור לאתר: https://carebell.vercel.app

1. **מהנדס המערכת: לאון פלדמן**

העבודה חולקה לזוגות (כפי שניתן לראות בטבלה), כל זוג עבד על סעיפים מסויימים מתוך המשימה, ולבסוף עברנו כולנו יחד על הכל, אישרנו והגשנו. התנהלנו בקבוצת הוואטסאפ, בעזרת גוגל drive וכל העבודה על הפרוייקט נעשתה תחת גיטהאב משותף.

שם חבר הצוות	משימות שהוקצו	משימות שהושלמו
לאון פלדמן מור הודיה ממן	6,7	הושלם
חסן עבדאללה עומרי עבדאללה	2,3	הושלם
אשרף עטשי כיאן גדבאן	4,5	הושלם

2. רשימת דרישות:

- **דרישות פונקציונליות**
- **דרישות לא פונקציונליות (בנפרד, יש לסווג דרישות לא פונקציונליות לפי wikipedia NFR).**
- **דרישות ממשק חיצוניות.**

Software Requirement Specification (SRS) - CareBell

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1. Introduction

1.1 Product Scope

CareBell is a digital care assistance platform designed specifically for seniors participating in the "Meals on Wheels" program. The system enhances quality of life for elderly users by providing personalized digital assistance, medication reminders, social connectivity, and meal information management through an intuitive, senior-friendly interface.

Business Goals:

- Reduce social isolation among seniors by 40%
- Improve medication adherence rates by 60%
- Increase program participant satisfaction by 35%
- Bridge the digital divide for elderly users

Benefits:

- Enhanced health management through automated reminders
- Improved social connectivity with family and community
- Simplified access to meal and nutritional information
- Emergency support accessibility

1.2 Product Value

CareBell addresses critical challenges faced by seniors:

Problem Solved: Social isolation and health management difficulties among elderly participants in community meal programs

Value Proposition:

- **Health Management**: Automated, personalized medication tracking and reminders
- **Social Connection**: Simplified video calling and virtual community participation
- **Information Access**: Easy-to-understand meal information and daily updates
- **Emergency Support**: One-touch access to emergency contacts and services
- **Digital Inclusion**: Technology designed specifically for limited tech experience

1.3 Intended Audience

Primary Users:

- Adults aged 70+ participating in "Meals on Wheels" programs
- Limited technology experience (beginner level)
- Potential visual or hearing impairments

- Living independently but requiring daily assistance
- Varying cognitive function levels

User Characteristics:

- Prefer large, simple interfaces
- Need audio support for visual content
- Require minimal learning curve
- Value routine and consistency

Secondary Users:

- Family members and caregivers
- Program administrators
- Healthcare providers

1.4 Definitions and Acronyms

SRS - Software Requirement Specification

NFR - Non-Functional Requirement

API - Application Programming Interface

QR Code - Quick Response Code for scanning meal package information

WebRTC - Web Real-Time Communication technology for video calls

UI/UX - User Interface/User Experience

Bella - AI assistant avatar within the CareBell system

HIPAA - Health Insurance Portability and Accountability Act

AES-256 - Advanced Encryption Standard with 256-bit key

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2. System and Functional Requirements

2.1 User Interface and Navigation

FR001: The system must display large, high-contrast buttons with minimum 60px height for all primary actions

FR002: The system must provide a clearly labeled "Back to Main Menu" button on every screen except the homepage

FR003: The system must include simple breadcrumb navigation showing current location within the app

FR004: The system must support voice-activated navigation using predefined voice commands

FR005: The system must provide text-to-speech capability for all on-screen content

FR006: The system must include adjustable text size settings with four levels: Small, Medium, Large, Extra Large

FR007: The system must display no more than 6 primary actions on the main screen to prevent cognitive overload

FR008: The system must use consistent color schemes and visual language throughout the application

FR009: The system must provide immediate visual feedback for all user interactions

FR010: The system must include a persistent red "Emergency" button accessible from any screen

2.2 Bella AI Assistant Functionality

FR011: The system must include an AI avatar named "Bella" with context-appropriate animated facial expressions

FR012: The system must allow users to initiate conversations with Bella via large button click or voice command

FR013: The system must enable Bella to provide personalized medication reminders with user's name

FR014: The system must allow Bella to answer questions about meal contents and nutritional information

FR015: The system must enable Bella to provide weather updates and simplified news summaries

FR016: The system must allow Bella to guide users through app features with step-by-step audio instructions

FR017: The system must enable Bella to recognize basic emotional cues and respond appropriately

FR018: The system must allow Bella to maintain conversation context within a single user session

FR019: The system must enable Bella to escalate to human support when unable to assist effectively

FR020: The system must log all Bella interactions for continuous improvement of response accuracy

2.3 Medication Management

FR021: The system must allow users to input medication schedules with dosage and timing information

FR022: The system must send both visual and audio reminders at prescribed medication times

FR023: The system must enable users to mark medications as "taken," "skipped," or "delayed"

FR024: The system must track medication adherence patterns and generate weekly reports

FR025: The system must alert users when medication supplies are projected to run low (7-day warning)

FR026: The system must provide basic drug interaction warnings when multiple medications are entered

FR027: The system must allow authorized family members to receive medication adherence notifications

FR028: The system must include a pill identification feature using image recognition technology

FR029: The system must provide medication education materials written in simple, large-font language

FR030: The system must integrate with participating pharmacy systems for automatic refill reminders

2.4 Social Connection Features

FR031: The system must support one-click video calling to pre-configured family contacts

FR032: The system must enable group video calls with up to 6 participants simultaneously

FR033: The system must provide virtual meeting rooms for scheduled social activities

FR034: The system must allow users to join community events with simple calendar integration

FR035: The system must include a messaging system supporting large text and voice messages

FR036: The system must enable photo sharing with automatic image resizing and simple navigation

FR037: The system must provide calendar integration showing upcoming family events and medical appointments

FR038: The system must include cognitive stimulation games designed for seniors

FR039: The system must enable users to create and manage their personal contact list

FR040: The system must provide activity suggestions based on user preferences and health status

2.5 Meal Information System

FR041: The system must scan QR codes on meal packages to display comprehensive nutritional information

FR042: The system must highlight allergens and dietary restrictions relevant to the user's health profile

FR043: The system must provide meal preparation instructions in large, clear text with visual aids

FR044: The system must display caloric and nutritional content in easy-to-understand visual formats

FR045: The system must allow users to rate meals and provide simple feedback

FR046: The system must track user's meal preferences and dietary restrictions over time

FR047: The system must provide alternative meal suggestions based on dietary needs and preferences

FR048: The system must include educational content about nutrition specifically for seniors

FR049: The system must integrate with meal delivery schedules and provide arrival notifications

FR050: The system must store meal history for nutritional tracking and health reporting

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3. External Interface Requirements

3.1 User Interface Requirements

EIR001: The system must provide a touch-optimized interface with minimum 44px touch targets

EIR002: The system must support both portrait and landscape orientations on tablet devices

EIR003: The system must be compatible with screen readers and assistive technologies

EIR004: The system must provide high contrast mode with 4.5:1 minimum contrast ratio

EIR005: The system must support keyboard navigation for all interactive elements

3.2 Hardware Interface Requirements

EIR006: The system must interface with tablet cameras for QR code scanning functionality

EIR007: The system must utilize device microphones for voice input with noise cancellation

EIR008: The system must access device speakers for audio output with volume normalization

EIR009: The system must support standard Bluetooth connectivity for hearing aid integration

EIR010: The system must function on tablets with minimum 3GB RAM and Android 8.0+ or iOS 12+

3.3 Software Interface Requirements

EIR011: The system must integrate with external weather APIs (OpenWeatherMap) for current conditions

EIR012: The system must connect to news RSS feeds filtered for senior-relevant content

EIR013: The system must implement WebRTC for peer-to-peer video communications

EIR014: The system must integrate with SMS gateways for emergency notifications

EIR015: The system must interface with pharmacy APIs for medication verification and refill management

EIR016: The system must connect to calendar services (Google Calendar, Outlook) for appointment management

3.4 Communication Interface Requirements

EIR017: The system must use HTTPS/TLS 1.3 for all data transmission

EIR018: The system must implement WebSocket connections for real-time chat and notifications

EIR019: The system must support RESTful API architecture for data exchange

EIR020: The system must integrate with SMTP servers for email notifications

3.5 Database Interface Requirements

EIR021: The system must interface with MongoDB for user profile and preference storage

EIR022: The system must support database connection pooling for optimal performance

EIR023: The system must implement automated database backup and recovery mechanisms

EIR024: The system must ensure ACID compliance for critical health-related transactions

EIR025: The system must provide data export capabilities for user information portability

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4. Non-Functional Requirements

4.1 Performance Requirements

NFR001: The application must load the main screen within 3 seconds on all supported devices

NFR002: The system must support up to 1000 concurrent users without performance degradation

NFR003: Voice command response time must not exceed 2 seconds

NFR004: Video calls must maintain quality with maximum 200ms latency

NFR005: Database queries must return results within 1 second for 95% of requests

4.2 Reliability Requirements

NFR006: The system must provide 99% uptime for core services such as reminders and communication features

NFR007: The system must perform automatic backup of user data every 24 hours

NFR008: The system must recover from failures within 15 minutes of issue detection

NFR009: The system must provide graceful degradation when external services are unavailable

NFR010: The system must maintain service during planned maintenance with less than 1 hour downtime per month

4.3 Usability Requirements

NFR011: The system must offer a senior-friendly user interface with large buttons, clear labels, and readable text

NFR012: The application must fully support screen readers and voice commands

NFR013: The system must include a "night mode" with high contrast for improved visibility

NFR014: The system must allow font size adjustment at four different levels

NFR015: New users must be able to complete basic tasks within 10 minutes of first use

4.4 Security Requirements

NFR016: The system must encrypt all sensitive user data using AES-256 encryption

NFR017: The system must authenticate user identity before accessing medical information

NFR018: The system must log all user actions for security audit purposes

NFR019: The system must comply with HIPAA regulations for health information protection

NFR020: The system must implement multi-factor authentication for administrative access

4.5 Maintainability Requirements

NFR021: The system must use modular code architecture to allow easy updates and feature additions

NFR022: The system must include comprehensive logging for issue identification and resolution

NFR023: The system must support automated testing with minimum 80% code coverage

NFR024: The system must provide clear documentation for all APIs and system components

NFR025: Code deployment must be automated with rollback capabilities within 5 minutes

4.6 Compatibility Requirements

NFR026: The system must function optimally on tablets and desktop computers

NFR027: The system must be compatible with major web browsers (Chrome, Firefox, Safari, Edge)

NFR028: The system must support responsive design for different screen sizes (10-15 inch displays)

NFR029: The system must work with assistive technologies including screen magnifiers

NFR030: The system must support offline functionality for core features during internet outages

4.7 Scalability Requirements

NFR031: The system architecture must support horizontal scaling to accommodate growing user base

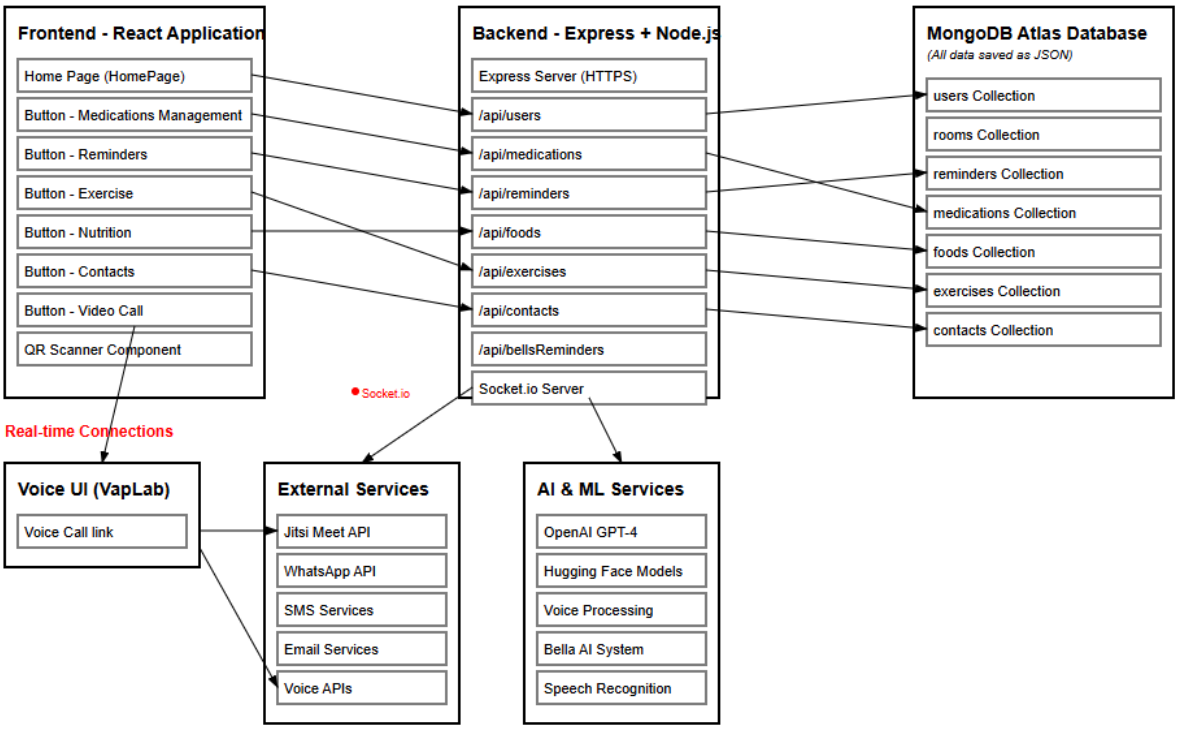
NFR032: The database must handle up to 10,000 user records efficiently

NFR033: The system must support geographic distribution across multiple server locations

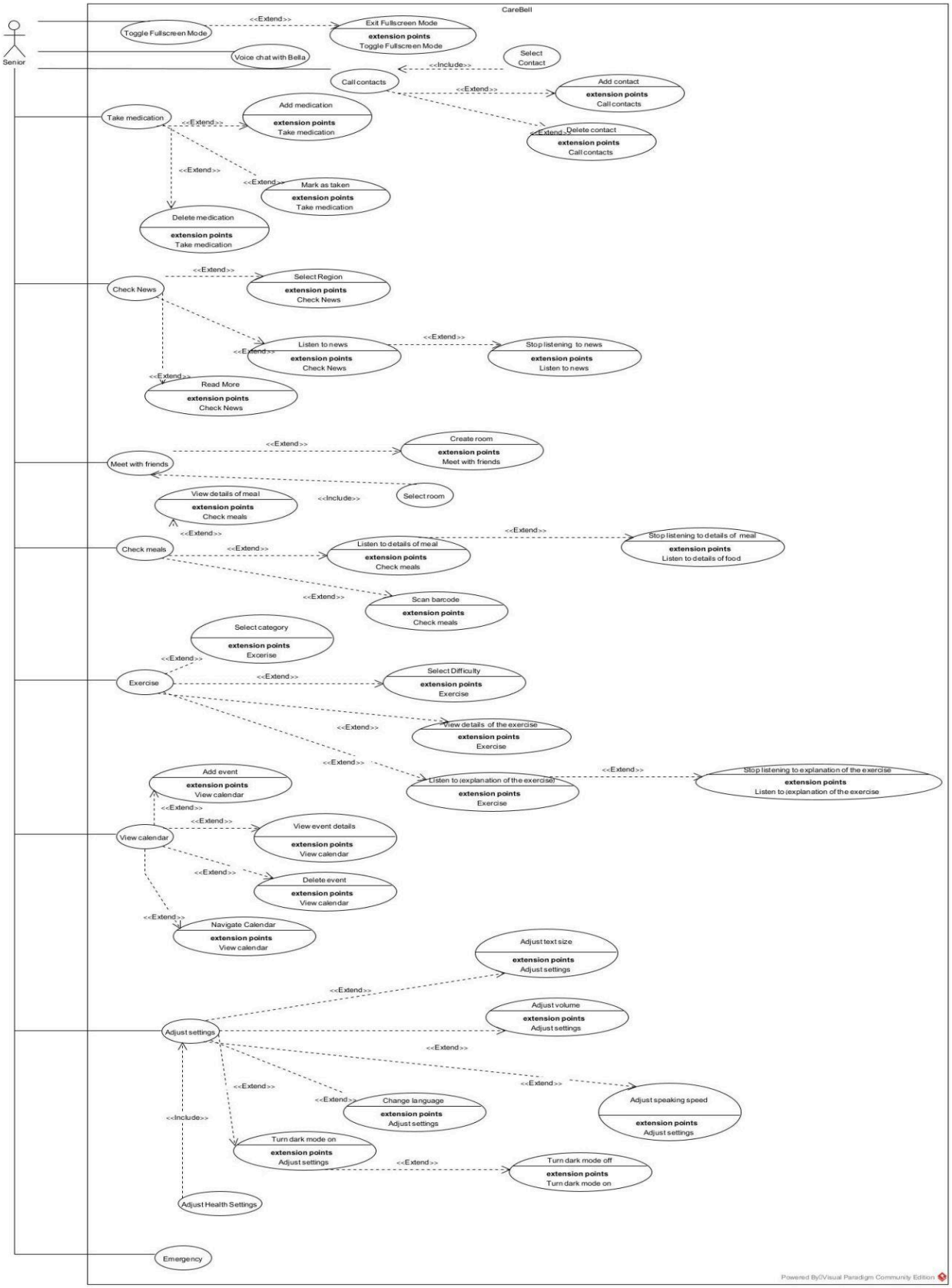
NFR034: The system must handle peak loads of 5x normal usage during emergency situations

NFR035: The system must scale video calling infrastructure to support 500 concurrent calls

3. הציגו ארכיטקטורה מעודכנת של האתר (תרשים הכולל את האלמנטים המרכזיים).



4. הציגו דיאגרמת use case המתארת את השימוש באתר.


CareBell
Senior
Toggle Fullscreen Mode
Exit Fullscreen Mode
extension points
Toggle Fullscreen Mode
Voice chat with Bella
Select Contact
Call contacts
Add contact
extension points
Call contacts
Delete contact
extension points
Call contacts
Take medication
Add medication
extension points
Take medication
Mark as taken
extension points
Take medication
Delete medication
extension points
Take medication
Check News
Select Region
extension points
Check News
Listen to news
extension points
Check News
Stop listening to news
extension points
Listen to news
Read More
extension points
Check News
Meet with friends
Create room
extension points
Meet with friends
Select room
View details of meal
extension points
Check meals
Check meals
Listen to details of meal
extension points
Check meals
Stop listening to details of meal
extension points
Listen to details of food
Scan barcode
extension points
Check meals
Exercise
Select category
extension points
Excerise
Select Difficulty
extension points
Exercise
View details of the exercise
extension points
Exercise
Listen to (explanation of the exercise)
extension points
Exercise
Stop listening to explanation of the exercise
extension points
Listen to (explanation of the exercise
View calendar
Add event
extension points
View calendar
View event details
extension points
View calendar
Delete event
extension points
View calendar
Navigate Calendar
extension points
View calendar
Adjust settings
Adjust text size
extension points
Adjust settings
Adjust volume
extension points
Adjust settings
Change language
extension points
Adjust settings
Adjust speaking speed
extension points
Adjust settings
Turn dark mode on
extension points
Adjust settings
Turn dark mode off
extension points
Turn dark mode on
Adjust Health Settings
Emergency
<<Extend>>
<<Include>>
Powered By Visual Paradigm Community Edition

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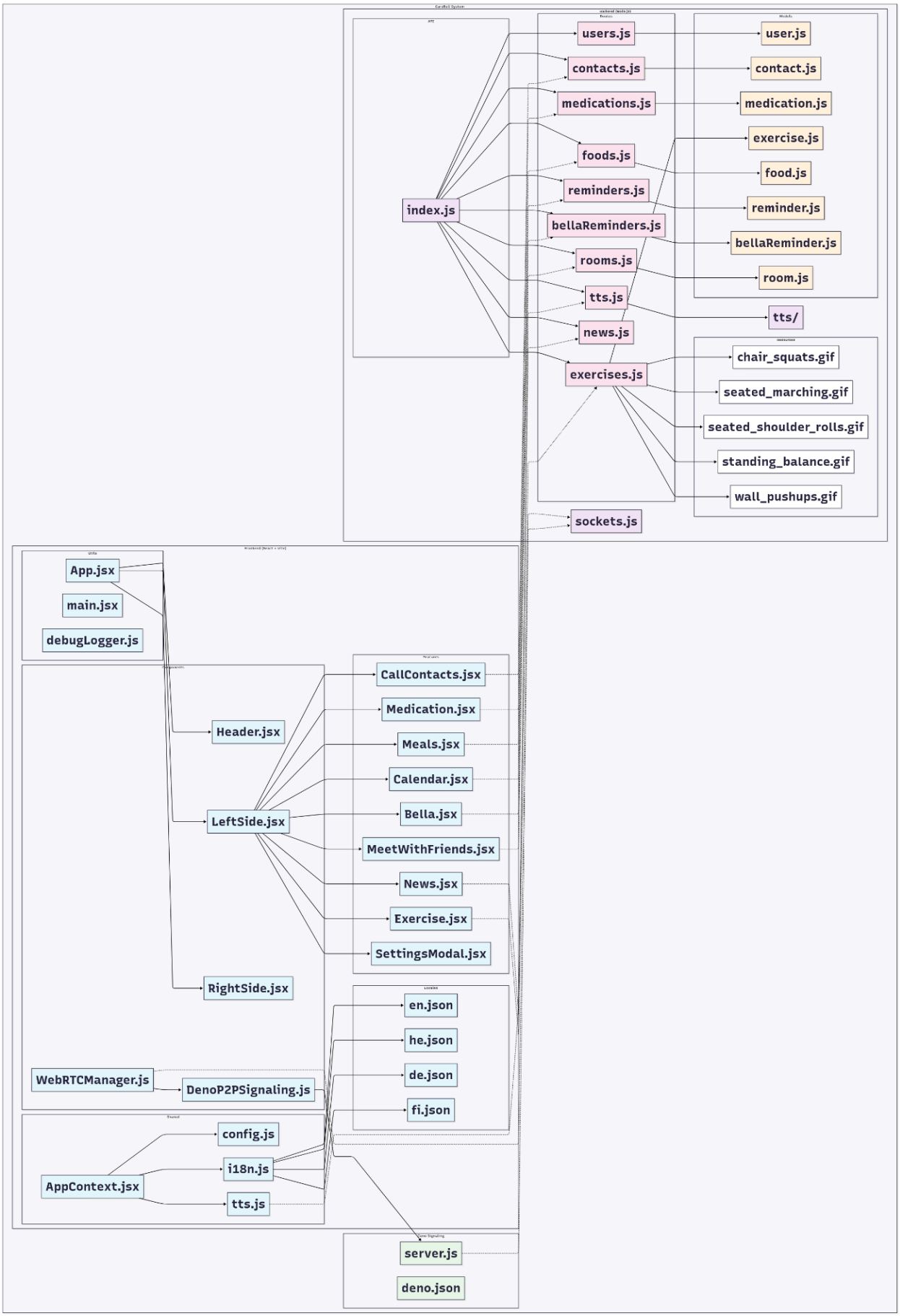
5. **<u>יש להציג מבנה סופי של האתר שלכם:</u>**

נדרשת בכל פרויקט פריסה מלאה (deplomentמ) של הפרויקט! ב - vercel.
לא יתקבלו הגשות של קבצים או אתר ב -localhost .

טכנולוגיות: להלן המרכיבים הטכנולוגיים המומלצים לשימוש בפרויקט:

- **<u>front-end</u>: React/Preact/Next with Tailwind**
- **<u>back-end</u>:**
  - **option 1 - remote services/APIs**
  - **option 2 - node js/express deployed on remote web server**

א. האתר ימומש ב -React/Preact/Next, וכן שימוש ב Tailwind - נא להציג דיאגרמה המתארת את התיקיות והקבצים השונים. יש לפרט את הקומפוננטות השונות.


index.js
users.js
contacts.js
medications.js
foods.js
reminders.js
bellaReminders.js
rooms.js
tts.js
news.js
exercises.js
sockets.js
user.js
contact.js
medication.js
exercise.js
food.js
reminder.js
bellaReminder.js
room.js
tts/
chair_squats.gif
seated_marching.gif
seated_shoulder_rolls.gif
standing_balance.gif
wall_pushups.gif
App.jsx
main.jsx
debugLogger.js
Header.jsx
LeftSide.jsx
RightSide.jsx
CallContacts.jsx
Medication.jsx
Meals.jsx
Calendar.jsx
Bella.jsx
MeetWithFriends.jsx
News.jsx
Exercise.jsx
SettingsModal.jsx
en.json
he.json
de.json
fi.json
WebRTCManager.js
DenoP2PSignaling.js
config.js
i18n.js
tts.js
AppContext.jsx
server.js
deno.json

ב. יש לפרט את פריטי המידע - יש להשתמש במידע אמיתי ורלוונטי לפרויקט שלכם (בשליפה ממסד נתונים חיצוני או מ - API). יש להראות דיאגרמת מבנה DB.

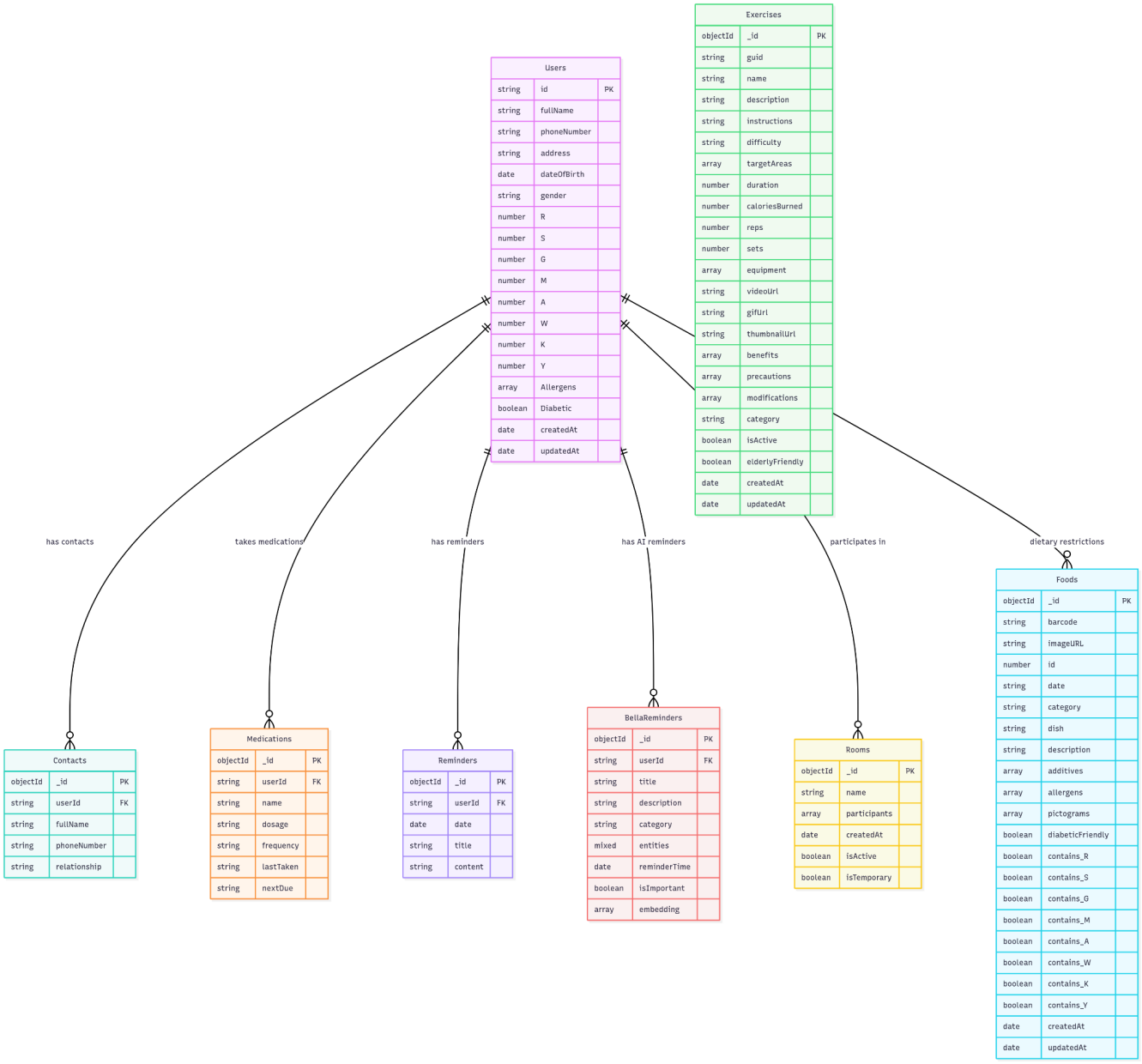
- משתמשים
  - מידע אישי: שם, טלפון, כתובת, תאריך לידה, מגדר
  - אלרגיות ומגבלות תזונה (R, S, G, M, A, W, K, Y)
  - סוכרת (Diabetic)
- אנשי קשר
  - שם מלא, טלפון, קרבה משפחתית
- תרופיות
  - שם התרופה, מינון, תדירות, לקיחה אחרונה, מועד הבא
- מזון
  - ברקוד, תמונה, קטגוריה, מנה, תיאור
  - תוספי מזון, אלרגנים, מתאים לסוכרתיים
- אימונים
  - שם, תיאור, הוראות, רמת קושי
  - אזורי מטרה, משך, קלוריות, חזרות
  - קישורי וידאו/GIF, מתאים לקשישים
- תזכורות
  - תאריך, כותרת, תוכן
- תזכורות בלה
  - קטגוריה, ישויות מחולצות, חשיבות
  - עיבוד AI של מידע אישי
- חדרים
  - שם, משתתפים, סטטוס פעיל, זמני/קבוע

השתמשנו ב MongoDB Atlas כמסד ניתונים ענני

השתמשנו ב Tagesschau API כדי הציג חדשות גרמניות אמיתיות

השתמשנו ב OpenAI API לעיבוד טקסט לתזכורות חכמות

השתמשנו ב Socket.IO לתקשורת real-time



קשרים במסד ניתונים:

- Users → Contacts: קשר N:1 (משתמש יכול לקבל מספר אנשי קשר)
- Users → Medications: קשר N:1 (משתמש יכול לקבל מספר תרופות)
- Users → Reminders: קשר N:1 (משתמש יכול לקבל מספר תזכורות)
- Users → BellaReminders: קשר N:1 (משתמש יכול לקבל תזכורות AI)
- Users → Rooms: קשר N:N (משתמש יכול להיות במספר חדרים)
- Users → Foods: קשר לוגי (מגבלות תזונה)

Developer Documentation for Carebell (תיק למתכנת)

Project Overview

CareBell combines a **React (Vite) frontend** with an **Express+MongoDB backend** and an **Deno WebSocket signaling server** for peer-to-peer video calling used in Meet-With-Friends.
All applications are run using nodejs

Inside the git repository all environments (front/back/deno) are divided into folders. Running them in Vercel or Deno requires setting that folder as root.
CareBell/ - The CareBell frontend React application.
backend/ - The expressJs server that contains REST API and MongoDB api
deno-signaling/ - Deployment for Meet-With-Friends P2P signaling using Deno

Deno Signaling Server Overview

The P2P signaling service in deno-signaling/server.js designed to run on Deno deployment creates a WebSocket for WebRTC, it is responsible for maintaining active rooms and routes ICE candidates/offers/answers between the peers. The server exposes /health and /stats HTTP endpoints for status retreival

Backend Overview

The backend runs on expressJs and is the main way the React app gets data.
It currently supports Vercel deployment and generic nodejs (npm) deployments
We'll go over each folder inside backend/ and what does it include

backend/api/ - contains the index.js that starts the server, both the vercel.json and package.json look at the index.js in this folder

backend/models/ - contains all the models used for mongodb, when adding or retrieving objects from mongodb, it will use the models as templates.

backend/routes/ - expressJs REST API, we expose these to provide different services using the server.
They can be called from the frontend or from your browser by typing the server URL and the exposed REST API

(e.g. https://URL.COM/users/addUser alongside a json with a fitting json object with the user model)
Below is a table of each route and what service does it provide

Route Name	Filename	Description
Users	users.js	User profile CRUD
Contacts	contacts.js	Manage phone contacts (Add/Remove)
Foods	foods.js	Fetch meals from the DB
Medications	medications.js	Manage medications per user CRUD
Reminders	reminders.js	Calendar reminders per user CRUD
Exercises	exercises.js	Fetch exercises from DB
Rooms	rooms.js	Create/join/leave video rooms
News	news.js	Fetch daily news via Tagesschau API
BellaReminders	bellaReminders.js	Analyze text from the Bella AI using OpenAI, extract personal information and store in DB
TTS	tts.js	Local TTS api to generate speech audio files from given text in json

backend/resources/ - used to save resources locally, like images, currently used to load Exercises gifs.

backend/tts/ - contains the binary program for piper, which is what we use for our tts

Frontend Overview

The main application run in React using Vite.
Root directory is CareBell/
All the main files and components are under CareBell/src
The Process when running the app is
Nodejs -> /index.html -> src/index.jsx -> src/App.jsx
Then all the other components are loaded underneath App.jsx
The app is divided into the following folders in CareBell/src:
components/ - has the main Layout files “Header.jsx, LeftSide.jsx, RightSide.jsx” alongside “DenoP2PSignaling.js” and “WebRTCManager.js” used for the video chat room connections

features/ - Contains all the main features of the application, all features self-contain their DOM and Logic.
Below is a table explaining what are the existing features and their descriptions

Feature	Description
Bella.jsx	Integrates Vapi AI Assistant, the user can chat with the AI and interact with other components, handles user intent, voice call control and chat history (every language uses a different assistant)
CallContacts.jsx	Call Contacts interface and management, each button is set to call the defined telephone using a tel url
MeetWithFriends.jsx	Video rooms, create/join/leave video chat rooms with WebRTC, uses DenoP2PSignaling and WebRTCManager
Medication.jsx	Medication manager, list medications, mark as taken
Meals.jsx	Scan QR Codes or type manually to fetch the meal data from the DB, utilizes the TTS in the backend.
News.jsx	Fetch daily news from the backend, utilizes TTS from the backend
Exercise.jsx	Fetch exercises from backend and show them, utilizies TTS from the backend
Calendar.jsx	Simple calendar feature, manages events and reminders.

SettingsModal.jsx	Settings screen, adjust font size, language. And set health options (e.g allergens) Unimplemented features: AI speech volume and speed Currently users are picked manually from a list here.

locales/ - most of the features use locales to display the text in the set language in SettingsModal, therefore we utilize i18n (set as 't' in code) to display the text from the correct locale files, currently there are 4 supported languages:
English - en.json
German - de.json
Hebrew - he.json
Finnish - fi.json

resources/ - contains resources for the frontend, currently houses the Bella AI image and the CareBells logo

shared/ - between some features/components we want to share values or make some values public to the app itself, we keep everything related to that here.
AppContext.jsx - contains React Context that can be used between features (like user, almost every feature needs to know what user it is on right now)
config.js - config file for backend API url or other features like P2P, News.
i18n.js - we implement i18next from this file, the locales are set here and all the components in the app use this file to display language-locale-based text
tts.js **-** simple script that features can call to get an immediate TTS response from the backend

utils/ - utilities and useful tools for the developer, currently houses debugLogger.js, which was mainly used to test new features and log them into the console so we can debug.

API and External Services

Throughout the backend and frontend we utilize API calls and some external services, below will be explained what each service is, where is it used, what .env /Environment Variables/API keys we need to run it.

MongoDB via Mongoose - Database connected from our expressJs backend, Connection URL:
mongodb+srv://CareBell:vTDHDu9pHns9HNlw@cluster0.bqe7zge.mongodb.net/CareB

ell
Under the connection we use the database ‘CareBell’ where all the collections are saved.
We require the mongodb url as an environment variable:
MONGODB_URI

VAPI AI - https://vapi.ai/
We use VAPI as an API call to start a call with our AI assistant, inside the site we set assistants, their AI language model, their TTS service and transcriber so we can display the text to the user.
Since we use multiple languages we set it so for each language we have a different assistant alongside the account’s public key for vapi
Environment Variables (Set in both .env and vercel)
VITE_VAPI_PUBLIC_KEY
VITE_VAPI_ASSISTANT_ID_EN
VITE_VAPI_ASSISTANT_ID_DE
VITE_VAPI_ASSISTANT_ID_HE

OpenAI - https://platform.openai.com
in our backend we can analyze the text provided by VAPI AI to analyze whether the user said personal information that should be remembered so we can put in the database later, for this we utilize OpenAI API calls from the backend,
Currently we use OpenAI GPT-3.5 with a prompt to ask whether a text is personal information, for that we require an OpenAI Environment Variable:
OPENAI_KEY

Tagesschau API (for News) - https://www.tagesschau.de/api2u/news
To fetch our daily news we utilize a free API service called Tagesschau.
It’s simple to implement and doesn’t require anything
ReadMe/Usage url:
https://github.com/AndreasFischer1985/tagesschau-api/blob/main/README_en.md

TTS (Piper) - https://github.com/rhasspy/piper
For our manual TTS that does not use VAPI AI, we utilize piper.
A binary program that uses voice models alongside text to provide an audio output of the text. We save this program manually and depending on whether we are running the program on Vercel/Linux/Windows it automatically picks the correct binary to produce

the audio file output

Deno Signaling Server
a WebSocket/P2P Signaling server that we use for Meet-With-Friends
It runs on Deno's standard library using serve from their server.ts with all the tasks defined in deno.json

OpenWeatherMap API - https://api.openweathermap.org/data/2.5/weather
To provide the weather/location in the header we use an api by openweathermap,
It does require a PUBLIC API KEY.

AI Prompts and External Code References
During our development we used AI tools to quickly get started on the app, Things like the initial react standard setup
"Can you give me code to start a react project, I would like the app to have a components folder where I can later add more features"
"Can you give me a proper layout for left side and right side of the screen"
And many more that help us get started on the React app itself and other components without spending a lot of time on the technicalities of how to write them specifically, we modified the results to suit our needs better and changes were made.

We did use some external code to make VAPI work, most of the code that uses API's of other services were provided by the documentation, for example the entire process behind sending VAPI information about the user was provided using vapi.send() which is documented here:
https://docs.vapi.ai/assistants/background-messages

Below is a table of all external packages we used and links to their respective docs of usage

Package	Where was it used	Documentation
mongoose	Backend MongoDB models	mongoosejs.com/docs
openai	backend/routes/bellaReminders.js for GPT-3.5 calls	platform.openai.com/docs

axios	Backend (news fetch) & multiple frontend features for API requests	axios-http.com
cors	Express middleware enabling CORS	github.com/expressjs/cors
dotenv	Loads environment variables in backend	github.com/motdotla/dotenv
multer	Handles multipart/form data in routes/rooms.js	github.com/expressjs/multer
socket.io / socket.io-client	Backend real-time API (sockets.js) and frontend fallback in MeetWithFriends.jsx	socket.io/docs
@vapi-ai/web	Voice assistant integration in Bella.jsx	docs.vapi.ai/client/web
react-router-dom	Frontend routing	reactrouter.com
react-icons	Icons used across components	react-icons.github.io
i18next / react-i18next / i18next-browser-languagedetector	Language locales via src/shared/i18n.js	i18next.com
react-qr-barcode-scanner	QR code scanning in Meals.jsx	github.com/MadRabbit/react-qr-barcode-scanner
tailwindcss, postcss, autoprefixer	Styling for the React app	tailwindcss.com/docs postcss.org github.com/postcss/autoprefixer
nodemon	Backend development auto-reload	nodemon.io
piper TTS	Local binary invoked by backend/routes/tts.js	github.com/rhasspy/piper

Functions Overview

Backend Functions

File	Function	Description
backend/api/index.js	connectWithRetry()	Repeatedly tries to connect to MongoDB with retry logic on failure
	startServer()	Starts the HTTP/Socket.IO server and handles port conflicts
backend/sockets.js	cleanupUserFromRoom(userId, roomId)	Removes a user from a room and updates participants; deletes empty rooms
	Socket events (register, join-room, leave-room, p2p-signal, signal, etc.)	Manage room membership, relay P2P messages, and clean up on disconnect
backend/routes/users.js	GET /	Return all users from MongoDB
	POST /addUser	Create a new user document with validation and duplicate check
	PUT /:id	Update an existing user by ID
backend/routes/contacts.js	GET /getAll/:userId	Return all contacts for a user ID
	POST /addContact	Add a new contact record for a user
	DELETE /deleteContact/:id	Delete a contact by document ID
backend/routes/foods.js	GET /:barcode	Look up a food item by barcode and return details
	POST /addFood	Save a new food entry with various nutrition flags
backend/routes/medications.js	POST /addMedication	Create a medication record for a user
	PATCH /:id/updateLastTaken	Update a medication's last taken timestamp
backend/routes/reminders.js	POST /	Insert a new reminder document
	GET /:userId	Fetch all reminders for a user ID
	PUT /:userId/:id	Update a reminder by ID for a user
backend/routes/exercises.js	GET /elderly-friendly	List exercises flagged as elderly

		friendly and active
	POST /populate-sample	Populate the database with sample exercise data
	DELETE /clear-all	Remove all exercise documents from the collection
backend/routes/news.js	GET /todays-news	Fetch news articles from the Tagesschau API, mapping them to simplified fields
backend/routes/rooms.js	POST /create-default	Create a permanent default room and notify clients
	POST /create	Create a temporary room and add the creator as participant
	POST /join	Add a participant to an existing room and emit updates via Socket.IO
	POST /leave	Remove a participant; deletes the room if temporary and empty
	GET /	List all rooms with participant details included
backend/routes/tts.js	POST /	Spawn the Piper TTS binary with the proper model and return the WAV file
backend/routes/bellaReminders.js	POST /addReminder	Manually save a reminder object in MongoDB
	GET /user/:userId	Retrieve all Bella reminders for a user
	POST /analyze	Use OpenAI to classify text and optionally store extracted personal information
deno-signaling/server.js	broadcastToRoom()	Send a JSON message to everyone in a room except an optional user
	addUserToRoom() / removeUserFromRoom()	Track user membership and inform other participants when users join or leave
	handleWebSocket()	Handle all WebSocket signaling messages: join, leave, offer, answer, ICE, ping/pong
	HTTP handlers (/, /health, /stats)	Respond with server info, health, and room statistics with CORS

		headers

Frontend Functions

File	Function	Description
src/App.jsx	fetchJson(url)	Helper to fetch JSON and throw on HTTP errors
	App()	Root component that loads the first user, manages dark mode, and renders routes
src/components/Header.jsx	useEffect hooks	Update date/time, obtain geolocation, and fetch weather details
src/components/DenoP2PSignaling.js	connect()	Open a WebSocket to the Deno signaling server and handle reconnection/ping logic
	sendOffer/Answer/IceCandidate()	Send WebRTC signaling messages to a specific peer via WebSocket
	disconnect()	Leave the room and close the WebSocket connection gracefully
src/components/WebRTCManager.js	initialize()	Create an RTCPeerConnection, add local tracks, and start negotiation if initiator
	sendP2PMessage()	Send data over the RTC data channel, with fallback to signaling if unavailable
	handleSignal({signal})	Process incoming offer, answer, or ICE candidate messages
	destroy()	Tear down the peer connection, tracks, and timers
src/features/Bella.jsx	classifyIntent(text)	Lightweight text classifier used on speech transcripts to trigger actions
	getAssistantId()	Map current i18n language to the proper Vapi assistant ID
	Call controls (startCall, endCall, toggleCall)	Start/stop the Vapi voice session
src/features/Calendar.jsx	fetchEvents()	Load reminders for the current user via Axios
	fetchWeather()	Retrieve a 7-day weather forecast based

		on geolocation
	openNew, openEdit, deleteEvent, saveEvent	Modal handlers for creating, editing, deleting calendar events
src/features/CallContacts.jsx	toggleSelect(id)	Mark/unmark contacts for bulk deletion
	handleBulkDelete()	Delete all selected contacts from the backend
	handleSave()	Add a new contact using form state values
src/features/Exercise.jsx	fetchExercises()	Get the exercise list (with fallback to HTTP) and populate state
	filterExercises()	Apply category and difficulty filters to the list
	speakText(text, id) & stopSpeaking()	Play or stop text-to-speech descriptions of exercises
	populateDatabase()	Send preset sample exercises to the backend API
src/features/Medication.jsx	markTakenNow(index, id)	Update medication timestamps locally and on the server
	saveMedication()	POST a new medication entry to the backend
	askDelete, cancelDelete, confirmDelete	Confirm and remove medication records by ID
src/features/Meals.jsx	fetchAllMeals()	Load meal data from the API and store it locally
	fetchByCode(code)	Look up a meal by barcode and speak its description
	toggleScanner()	Turn the barcode scanner on or off with spoken prompts
	createFoodDescription(item)	Build a TTS description string for a meal including allergens and additives
src/features/News.jsx	fetchTodaysNews(regions)	Download news from the backend with retries on error
	speakText(text, index) / stopSpeaking()	Start or stop audio playback for a news article
	createNewsDescription(article)	Produce a spoken summary string for an

		article
src/features/MeetWithFriends.jsx	createRoom()	POST to backend to create a temporary room and join it
	joinRoom(name)	Join an existing room, obtain media, and establish P2P connections
	leaveRoom()	Stop media streams, disconnect peers, and leave signaling rooms
	toggleAudio() / toggleVideo()	Mute/unmute local tracks and broadcast the state to peers
src/features/SettingsModal.jsx	changeLanguage(lng)	Switch the UI language and persist the choice in local storage
	changeUser(e)	Select which user is active by ID from a list
	toggleAllergen(key)	Add or remove allergen flags in the user profile
	saveHealth()	Persist updated allergen and diabetic settings to the backend

Setup Overview

Requirements

- Node.js (current LTS recommended)
- MongoDB instance and connection string
  It's important that MongoDB will have at least one user already defined
- Deno runtime (for optional signaling server)
- Environment variables: *MONGODB_URI, OPENAI_KEY*, optional *PORT*, *VITE_VAPI_** keys, *TTS_MODEL_EN/DE* etc.

Setup Walkthrough

Clone repository:

```
git clone https://github.com/Leontarin/CareBell
cd CareBell
```

Backend server:

```
cd backend
npm install
#create .env with MONGODB_URI and OPENAI_KEY
npm run dev
```

Frontend app:

```
cd CareBell
npm install
#create .env with VITE_VAPI_PUBLIC_KEY etc.
npm run dev
```

Deno signaling server:

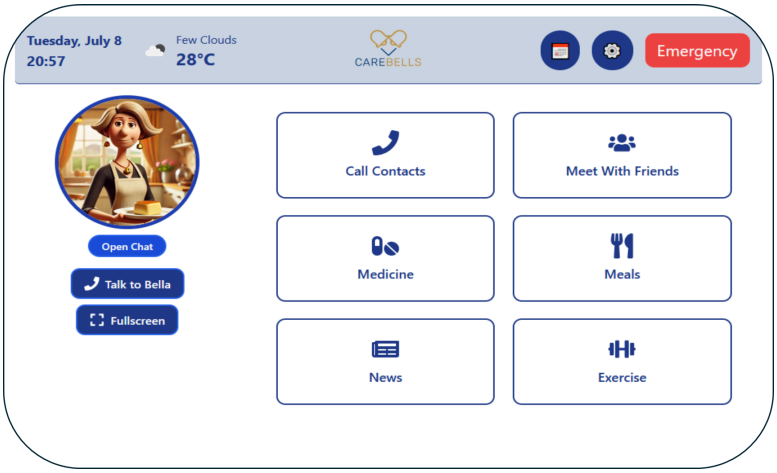
```
cd deno-signaling
deno task dev
```

Ensure MongoDB is running and update src/shared/config.js if API URLs differ.

A README with further details is available inside the GIT REPO

CareBells User Guide (תיק למשתמש)

1. Home Page



Header:

Date & Time (real-time, updates automatically each minute).
Weather (live, based on user's location).
CareBells Logo (button → returns to Home).
Calendar Icon (button → opens Calendar screen).
Settings Icon (button → opens Settings modal).
Emergency Button (currently disabled; future "Emergency" function).
Site language is auto-detected from the user's OS locale (EN, HE, DE or FI; defaults to EN).

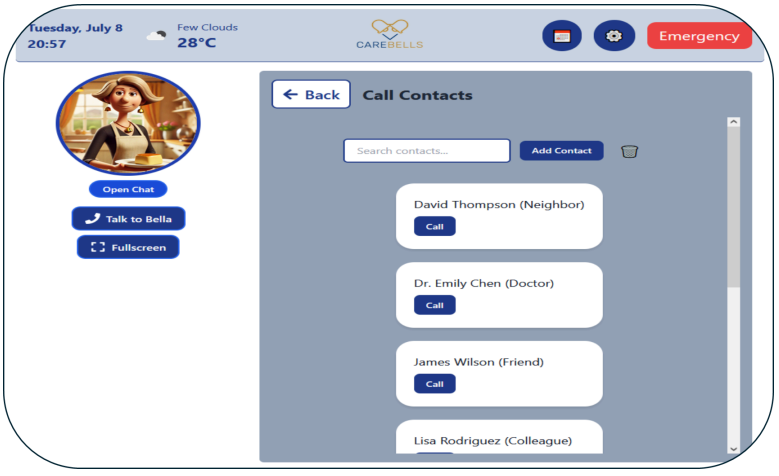
Left Side Chat Controls

Open Chat (button → slides in compact Bella chat panel).
Talk to Bella (button → opens full-screen AI chat).
Fullscreen (button → Bella chat in true full-screen overlay).

Main Menu Right Side Cards

Clicking any card navigates to the relevant feature's page.

2. Call Contacts



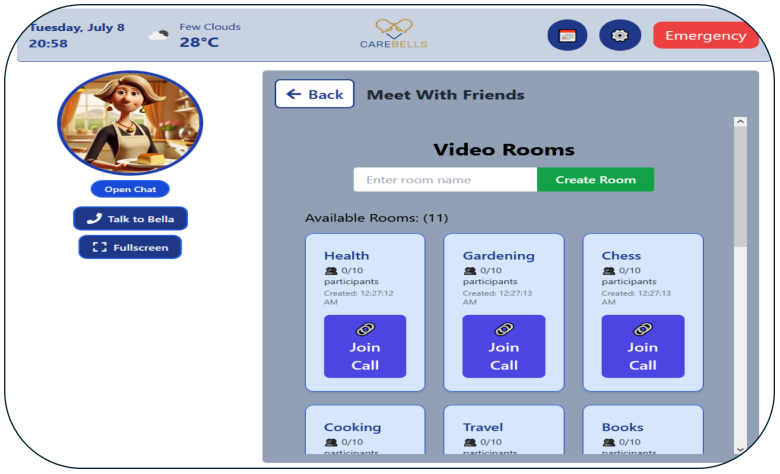
Search field filters your saved contacts in real time (starts empty).

Add Contact (button) → opens a form: enter name, phone, role, etc., then Save.

Trash icon (button) → enter "delete mode": select one or more contacts, then confirm deletion.

Call (button next to each contact) → launches the device's native phone dialer to call that person.

3. Meet With Friends



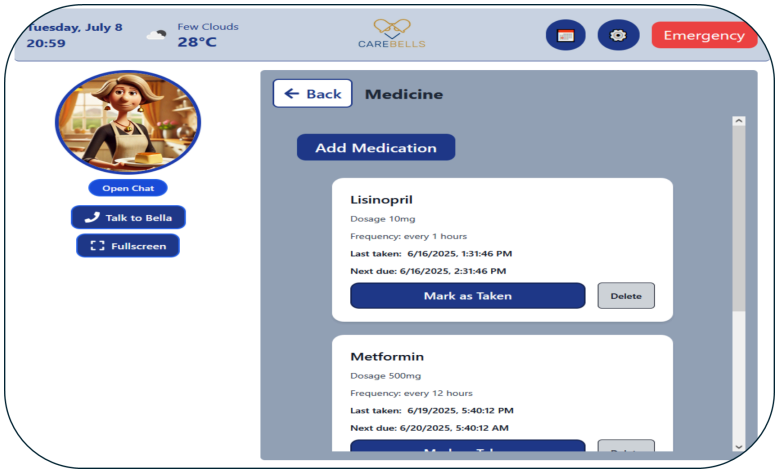
Enter room name + **Create Room** (button) → makes a new video room.

Available Rooms list:
Room title "👥 X/10 participants" count
Creation timestamp
Join Call (button) → enters that room.

Empty user-created rooms with zero participants are automatically removed.

When a room has participants, a **View Participants** button appears → shows a popup list of everyone inside.

4. Medicine



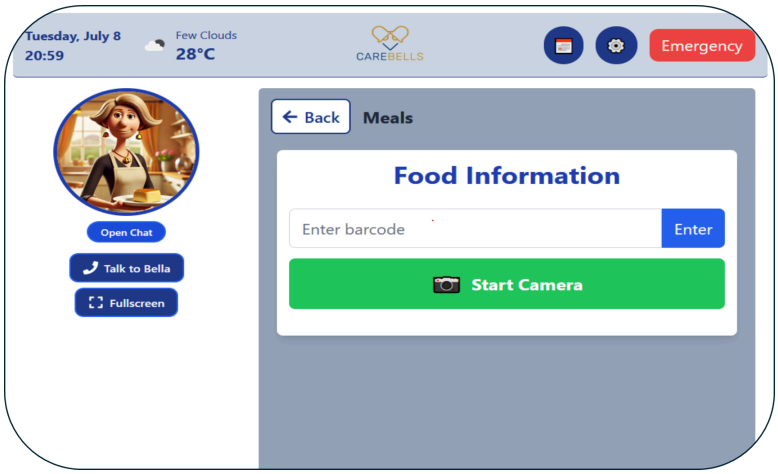
Add Medication (button) → opens a form: Name, Dosage, Frequency, then Save.
Each medicine card shows:

- Name (e.g. "Lisinopril")
- Dosage (e.g. "10 mg")
- Frequency (e.g. "every 12 hours")
- Last Taken timestamp
- Next Due timestamp

Mark as Taken (button) → logs the dose, updates both timestamps, and disables the button until near the next due time.

Delete (button) → asks for confirmation, then removes the medicine record.

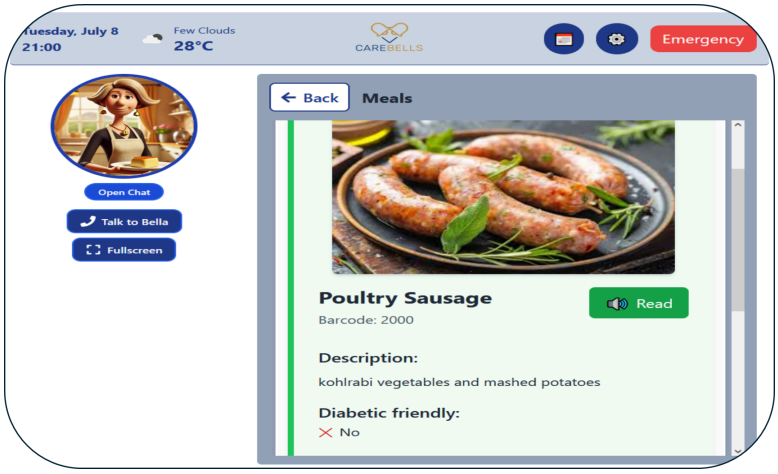
5. Meals (Food Information)



Barcode Entry: two ways to look up a meal:

1. Type the barcode number into the "Enter barcode" field + **Enter** button.
2. **Start Camera** (button) → opens your camera with voice-guided scanning.Once scanned or entered, you're taken to the meal's detail screen.

6. Meals (Example: Poultry Sausage)



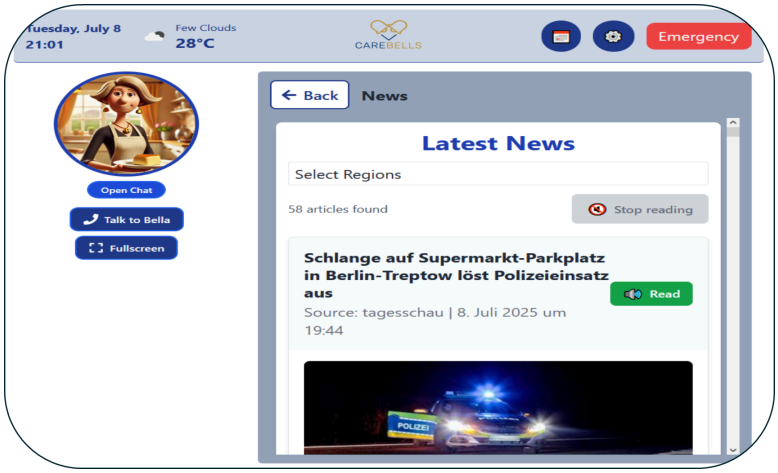
Shows:

Image of the meal
Name (“Poultry Sausage”)
Barcode (“2000”)
Description (“kohlrabi vegetables and mashed potatoes”)
Diabetic friendly: ✔️ or ❌ (based on your stored dietary profile)

A yellow warning banner for any allergen that the meal contains and you are allergic to. (if you are not allergic to any of the ingredients in the meal it will not show the warning banner)

Read (button) → uses text-to-speech to speak the meal name, ingredients and allergen info aloud.
Stop reading (button) → immediately halts any ongoing TTS playback.

7. News

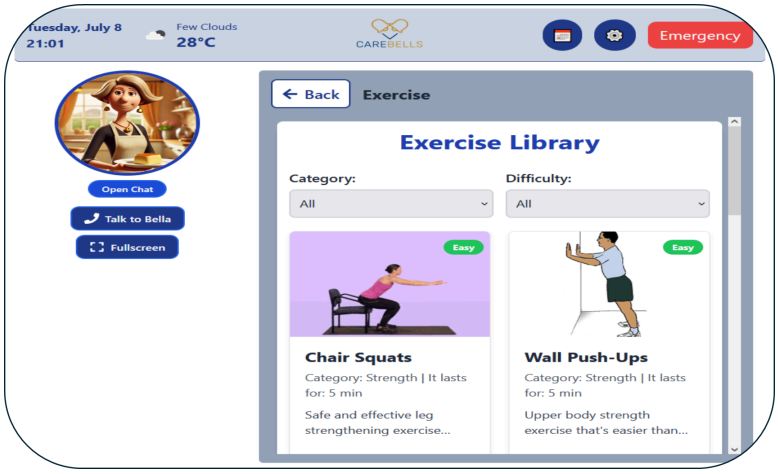


Select Regions (dropdown) → choose one or
more regions to filter your news feed.

Displays “**X articles found**” and lets you scroll
indefinitely through the list.

Each article shows:
Headline + image
Source name & timestamp
Read (button) → reads the article text aloud.
Stop reading (button) → immediately halts any ongoing TTS playback.

8. Exercise Library



Category filter (dropdown): All | Strength | Flexibility | Cardio | Balance
Difficulty filter (dropdown): All | Easy | Medium | Hard
Exercise cards display:
Image thumbnail
Title (e.g. “Chair Squats”)
“Category: … | It lasts for: X min”
Difficulty badge (e.g. “Easy”)

Clicking **View Details** on a card opens its full instructions screen.

9. Exercise Detail (Chair Squats)

Title & a gif at top. The gif shows how to practice each exercise.

Description: a short overview.

Instructions: numbered steps.

Benefits: bulleted list of outcomes.

Precautions: red bullets (e.g. “Hold onto chair for balance”).

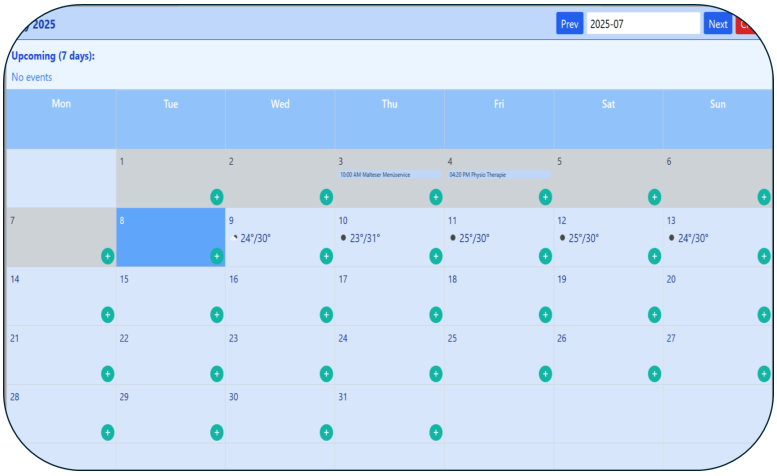
Modifications: green bullets (e.g. “Partial squats only”).

Read Instructions (button) → reads the instructions aloud.

10. Talk to Bella

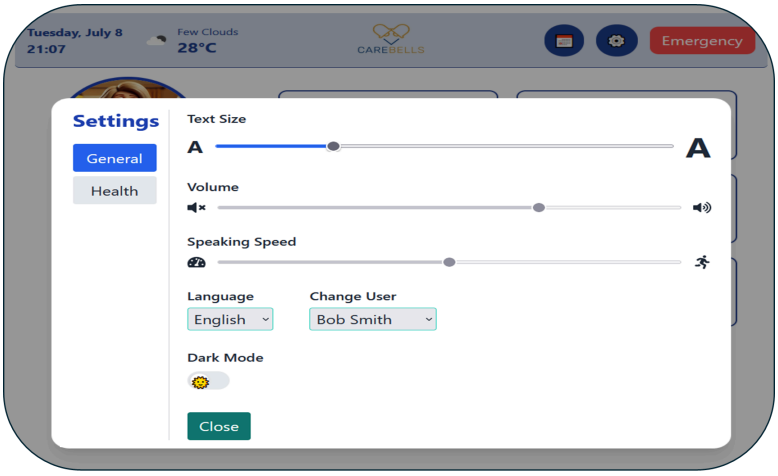
VoiceChat interface with AI assistant “Bella”: Voice chat bubbles display both Bella’s replies and your voice messages.
Global chat controls (same as Home Page sidebar):
Open Chat → opens the chat panel.
Close Chat → hides the chat panel.
Talk to Bella → opens full-screen voice chat and activateS “Bella”..
Fullscreen → opens the chat in a full-screen mode.

11. Calendar



Prev / Next (buttons) → navigate to the previous or next month.
Month view: weekdays across top, date cells below.
Upcoming (7 days): lists any events you’ve added for the coming week.
+ (button in each date cell) → opens a modal popup to enter event title, date & time.
Tapping each day will open a grid of hours of that day and will show if there's any events on that day. Also, you can tap on each hour and it will work the same as the “**+**” button.

12. Settings



General tab:
Text Size: slider between small and large.
Volume: slider (currently non-functional).
Speaking Speed: slider (currently non-functional).
Language: dropdown (English, Hebrew, German, Finnish).
Change User: dropdown (development only; will be removed in a final product).
Dark Mode: toggle switch → switches the entire UI into dark theme.
Health tab (development only): planned place to set user allergy profiles..

קישור לגיט: https://github.com/Leontarin/CareBell
קישור לאתר: https://carebell.vercel.app