Base Power Company Site Survey Application

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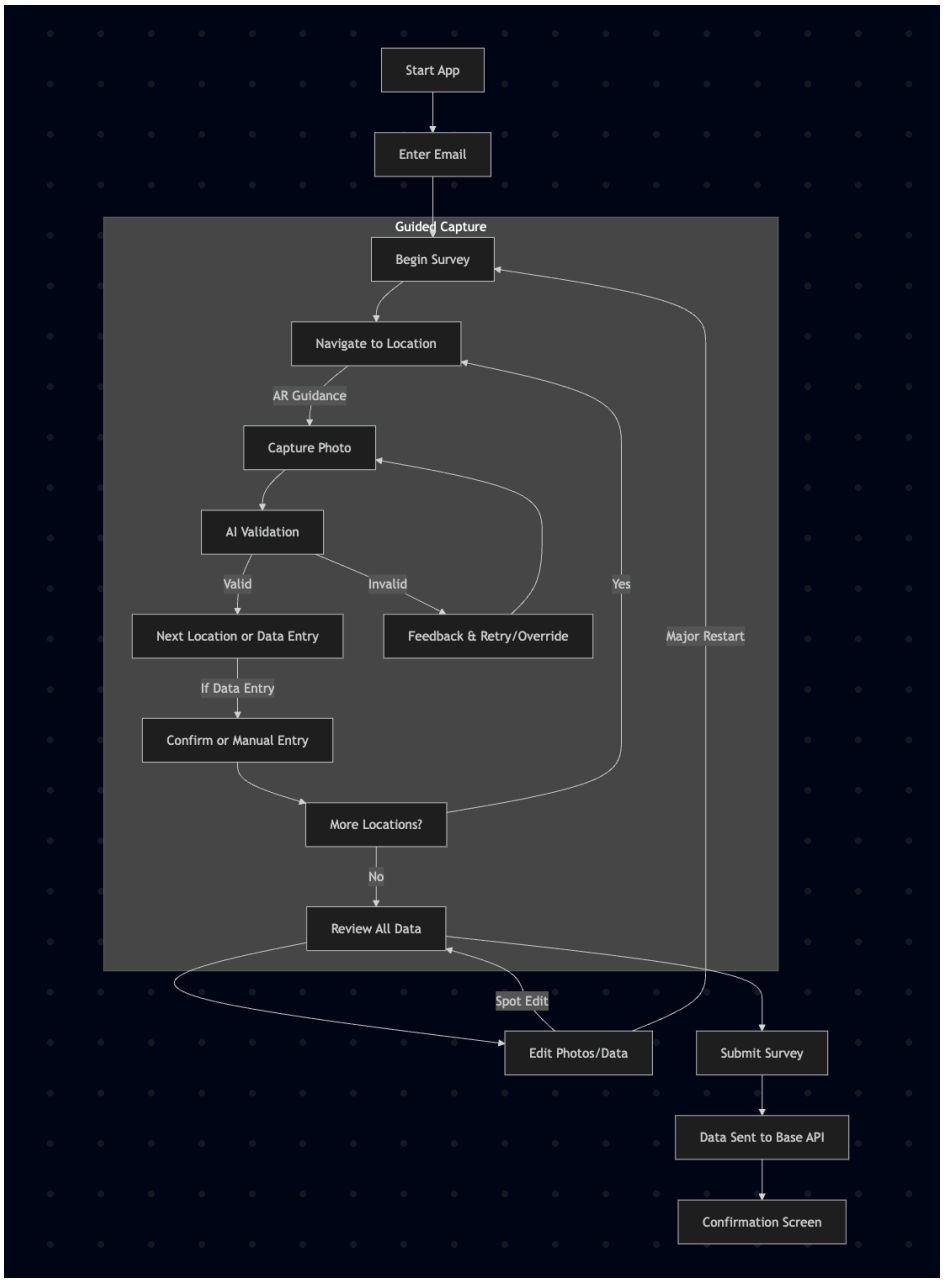
The “What”

Project Description:

A mobile first web survey to help Base Power Company collect customer site data to evaluate whether the customers are a good fit for their home battery system.

User Flow



```
graph TD
   A[Start App] --> B[Enter Email]
   B --> C[Begin Survey]
   subgraph Guided Capture
      C --> D[Navigate to Location]
      D -->|AR Guidance| E[Capture Photo]
      E --> F[AI Validation]
      F -->|Valid| G[Next Location or Data Entry]
      F -->|Invalid| H[Feedback & Retry/Override]
      H --> E
      G -->|If Data Entry| I[Confirm or Manual Entry]
      I --> J[More Locations?]
      J -->|Yes| D
      J -->|No| K[Review All Data]
   end

   K --> L[Edit Photos/Data]
   L -->|Spot Edit| K
   L -->|Major Restart| C
   K --> M[Submit Survey]
   M --> N[Data Sent to Base API]
   N --> O[Confirmation Screen]
```

Inputs

Customer email (used to key the survey data for submission and retrieval)

Camera Feed: Live video from the user's mobile device camera (for AR guidance and photo capture)

Photos Captured by User (guided by app, with specific framing for each):

Meter

Electricity Meter (close-up).

Area Around Meter (wide shot).

Area to the Right of Meter (wide shot).

Area to the Left of Meter (wide shot).

AC

A/C Unit (wide shot).

A/C Unit Label (close-up).

Second A/C Unit Label (conditional, if applicable).

Breaker Box

Main Breaker Box Interior (open, showing breakers).

Main Disconnect Switch (close-up).

Area Around Main Breaker Box (wide shot).

Any conditional photos (e.g., if elements are behind a fence or other obstructions, based on existing checklist)

User Confirmation and Overrides

Confirmation of AI-extracted data

Manual entry fallback if AI extraction fails

Override for validation failures (e.g., "Use photo anyway" after repeated retries)

Responses to conditional questions (e.g., "Do you have a second A/C unit?")

Device Permissions

- Asking users for permission before starting the camera.

Outputs

Submitted Survey Data

User Feedback

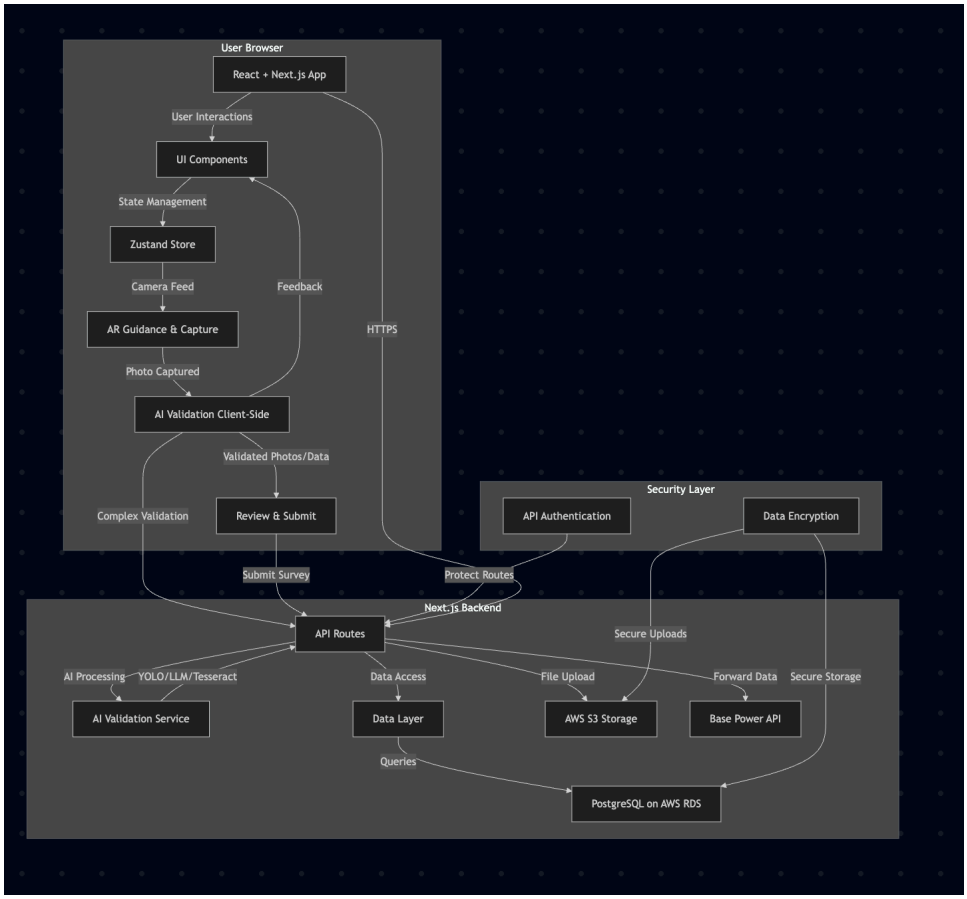
Immediate on-screen responses during the process (e.g., "Photo valid—proceeding" or "Retry: Image blurry")

Final Review Summary

API-Retrievable Data

The “How”

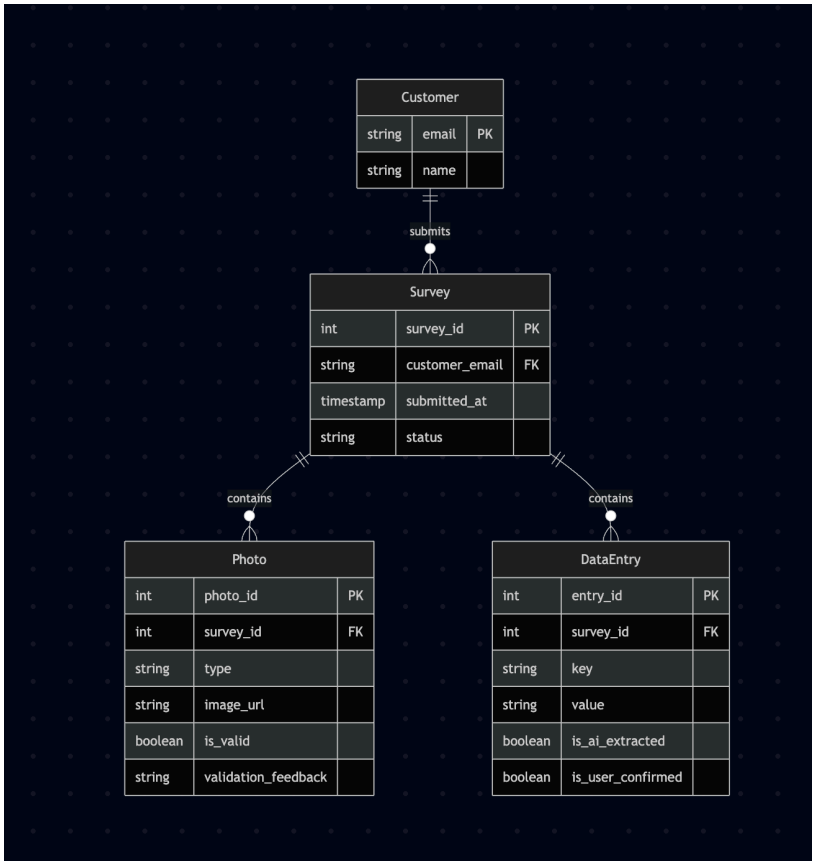
System Architecture




```mermaid
graph TD
    subgraph Client-Side [User Browser]
        A[React + Next.js App] -->|User Interactions| B[UI Components]
        B -->|State Management| C[Zustand Store]
        C -->|Camera Feed| D[AR Guidance & Capture]
        D -->|Photo Captured| E[AI Validation Client-Side]
        E -->|Feedback| B
        E -->|Validated Photos/Data| F[Review & Submit]
    end

    subgraph Server-Side [Next.js Backend]
        E -->|Complex Validation| G[API Routes]
        G -->|AI Processing| H[AI Validation Service]
        H -->|YOLO/LLM/Tesseract| G
```

```
    G -->|Data Access| I[Data Layer]
    I -->|Queries| J[PostgreSQL on AWS RDS]
    G -->|File Upload| K[AWS S3 Storage]
    F -->|Submit Survey| G
    G -->|Forward Data| L[Base Power API]
  end

  subgraph Security Layer
    M[API Authentication] -->|Protect Routes| G
    N[Data Encryption] -->|Secure Storage| J
    N -->|Secure Uploads| K
  end

  A -->|HTTPS| G
```

Entity Relationship Diagram




```mermaid
erDiagram
    Customer ||--o{ Survey : submits
    Survey ||--o{ Photo : contains
    Survey ||--o{ DataEntry : contains
```

```
  Customer {
    string email PK
    string name
  }

  Survey {
    int survey_id PK
    string customer_email FK
    timestamp submitted_at
    string status
  }

  Photo {
    int photo_id PK
    int survey_id FK
    string type
    string image_url
    boolean is_valid
    string validation_feedback
  }

  DataEntry {
    int entry_id PK
    int survey_id FK
    string key
    string value
    boolean is_ai_extracted
    boolean is_user_confirmed
  }
```

Technology Stack

Frontend:

React + Next.js + TailwindCSS + Shadcn + Zustand (state management)

Backend:

Next.js API routes (Golang if needed)

Database + Cloud Platforms:

PostgreSQL + Prisma ORM

Cloud Platform: AWS

File storage: AWS S3

AI / ML Models

- Use multimodal LLM's for the post picture analysis
- Create a "LLM Service" module to allow for model customization.
- Use YOLO for the part of the app that does the framing / photo helping (stretch goal)

Testing

- Also create a light test suite for various pictures and qualities
    - Blurry Pictures
- Manual testing will be conducted with 10 customer sites.

File Structure

```
project-root/
├── app/
│   ├── api/
│   │   ├── validate/               # Next.js API routes for LLM validation
│   │   │   └── route.ts            # POST: Send image to LLM, return validation
│   │   └── submit/                 # API route for submitting to Base API
│   │       └── route.ts            # POST: Forward photos/data to Base
│   ├── (survey)/                   # Main survey app routes
│   │   ├── layout.tsx              # Layout for survey pages (e.g., nav bar)
│   │   ├── page.tsx                # Landing page (email input)
│   │   ├── step/                   # Dynamic route for survey steps
│   │   │   └── [stepId]/page.tsx   # Individual step (e.g., meter, A/C)
│   │   └── review/page.tsx         # Review page for final data/photos
│   ├── globals.css                 # TailwindCSS global styles
│   └── favicon.ico                 # App favicon
├── components/                     # Reusable React components (ShadCN + custom)
│   ├── ui/                         # ShadCN components (e.g., Button, Modal)
│   │   ├── button.tsx
│   │   ├── modal.tsx
│   │   └── ...
│   ├── CameraView.tsx              # Webcam feed with AR overlays
```

```
│   ├── FeedbackModal.tsx          # Validation feedback (success/fail/override)
│   ├── PhotoPreview.tsx           # Thumbnail for review page
│   └── StepProgress.tsx           # Progress bar for survey steps
├── lib/                           # Utility functions and configs
│   ├── aws.ts                     # AWS S3 upload logic
│   ├── yolo.ts                    # YOLO model integration (ONNX.js)
│   ├── tesseract.ts               # Tesseract.js for client-side OCR
│   ├── llm.ts                     # LLM API client (e.g., xAI or OpenAI)
│   ├── db.ts                      # PostgreSQL connection (pg or drizzle)
│   └── types.ts                   # TypeScript interfaces (e.g., Survey, Photo)
├── public/                        # Static assets
│   ├── models/                    # Pre-trained YOLO model (e.g., yolov8n.onnx)
│   │   └── yolov8n.onnx
│   ├── images/                    # Static images (e.g., examples, logos)
│   └── fonts/                     # Custom fonts (if any)
├── stores/                        # Zustand stores
│   └── surveyStore.ts             # State for survey (steps, photos, data)
├── prisma/                        # Prisma ORM for PostgreSQL (optional)
│   └── schema.prisma              # Database schema (Customer, Survey, Photo)
├── scripts/                       # Utility scripts (e.g., DB seeding)
│   └── seed.ts
├── tests/                         # Tests for components and API routes
│   ├── components/
│   │   └── CameraView.test.tsx
│   └── api/
│       └── validate.test.ts
├── .env                           # Env vars (AWS keys, DB URL, API keys)
├── next.config.js                 # Next.js config (e.g., WebAssembly for ONNX)
├── tailwind.config.js             # TailwindCSS config
├── tsconfig.json                  # TypeScript config
├── package.json                   # Dependencies and scripts
└── README.md                      # Project documentation
```

Brand Design

BASE

VISUAL IDENTITY

Primary colors

These colors should remain dominant throughout the Base experience. While not every element must use these specific tones, they should be consistently present across touchpoints.

Grounded
#084D41
rgb(8, 77, 65)

Livewire
#D0F585
rgb(208, 245, 133)

Aluminum
#EDEFF0
rgb(237, 239, 240)

What's new

Transitioning to a brighter, lighter color palette with less neon green on black. Leading with the darker green, supported by additional colors to expand the palette. White and light gray will provide subtle background support.

BASE

VISUAL IDENTITY

Full color palette

Our color palette includes foundational primitives and their variations, which should remain consistent across all materials. Primitives are used for key elements like logos and CTAs, while scales provide supporting accents. Ensure sufficient contrast for readability, follow WCAG standards, and use bold colors sparingly to maintain balance. Align colors with the intended mood and verify they display correctly across devices and mediums.

What's new

Our greys have changed to a warmer tone. Green 80 and Green 40 are now more desaturated. The darkest orange tone is now deeper and named orange 90.

Primitives

Coal/Grey 100	Aluminum/Grey 5	Grounded/Green 90	Livewire/Green10	White

#292826
rgb(41, 40, 38)
2336 C / 419 U
	#F0EEEB
	rgb(240, 238, 235)
	Warm Gray 1 C / Warm Gray 1 C
		#084D41
		rgb(8, 77, 65)
		342 C / 3295 U
			#D0F585
			rgb(208, 245, 133)
			374 C / 374 U
				#FFFFFF
				rgb(255, 255, 255)

Greyscale

Grey 100	Grey 80	Grey 60	Grey 40	Grey 20	Grey 5

#292826
rgb(41, 40, 38)
	#54524F
	rgb(84, 82, 79)
		#7F7D7A
		rgb(127, 125, 122)
			#A9A8A7
			rgb(169, 168, 167)
				#D8D7D5
				rgb(216, 215, 213)
					#F0EEEB
					rgb(240, 238, 235)

Greens

Green 90	Green 80	Green 40	Green 10	Green 5

#084D41
rgb(8, 77, 65)
	#417662
	rgb(65, 118, 98)
		#79B25E
		rgb(121, 178, 94)
			#D0F585
			rgb(208, 245, 133)
				#ECFFC7
				rgb(236, 255, 199)

Oranges

Orange 90	Orange 40	Orange 20	Orange 5

#77300D
rgb(119, 61, 13)
	#E57D27
	rgb(229, 125, 39)
		#FFAB64
		rgb(255, 171, 100)
			#FFEFD2
			rgb(255, 254, 210)

Reds

Red 80	Red 40	Red 20	Red 5

#AC250F
rgb(172, 37, 15)
	#DF4931
	rgb(223, 73, 49)
		#F79C8D
		rgb(247, 156, 141)
			#FFEDEA
			rgb(255, 237, 234)

Blues

Blue 90	Blue 40	Blue 10	Blue 5

#013C69
rgb(1, 60, 105)
	#196DAD
	rgb(25, 109, 173)
		#B9E2E9
		rgb(185, 226, 233)
			#E8F8FB
			rgb(232, 248, 251)

VISUAL IDENTITY

Typography

Our primary typeface is PP Neue Montreal. We have three fonts we use within the system that are Semibold, Medium, and Regular. Inter can be used if PP Neue Montreal is not available.

What's new

Formally introducing a Semibold weight to enhance typographic flexibility.
The typeface Inter will officially be our fall back in cases where PP Neue Montreal is not available.

PP Neue Montreal

Sample Text: Base offers a 20-50 kWh battery/batteries and an 11 kW inverter, making it one of the largest home backup systems on the market. Base's batteries have a longer duration and can back up more appliances in your home than almost any other home backup solution.

Aa **PP Neue Montreal**
Semibold

Aa **PP Neue Montreal**
Medium

Inter

If PP Neue Montreal is unavailable in your program, use Inter as the preferred alternative. Inter is also the typeface used in iOS and Android applications.

VISUAL IDENTITY

Typography hierarchy

The typography hierarchy establishes a clear and consistent structure for text across the brand, enhancing readability and reinforcing visual identity. By defining styles for headings and body copy, it ensures flexibility, clarity, and alignment with the brand's tone, whether in digital or print applications.

What's new

Formally introducing a Semibold weight to enhance typographic flexibility.
Typography hierarchy now begins with these Primitives, establishing a foundational system. Specific use cases (e.g., website design) build on this foundation and can be outlined separately.

TITLES

Heading 1
Heading 1 / Semibold / 48px

Heading 2
Heading 2 / Semibold / 40px

Heading 3
Heading 3 / Semibold / 32px

Heading 4
Heading 4 / Semibold / 24px

Heading 5
Heading 5 / Semibold / 20px

Heading 6
Heading 6 / Semibold/ 18px

BODY COPY

Body XLarge
The quick brown fox jumps over the lazy dog
Body XLarge / Semibold/ 18px

Body XLarge
The quick brown fox jumps over the lazy dog
Body XLarge / Medium / 18px

Body Large
The quick brown fox jumps over the lazy dog
Body Large / Semibold / 16px

Body Large
The quick brown fox jumps over the lazy dog
Body Large / Medium / 16px

Body Medium
The quick brown fox jumps over the lazy dog
Body Medium / Semibold / 14px

Body Medium
The quick brown fox jumps over the lazy dog
Body Medium / Medium / 14px

Body Small
The quick brown fox jumps over the lazy dog
Body Small / Semibold / 12px

Body Small
The quick brown fox jumps over the lazy dog
Body Small / Medium / 12px

Body XSmall
The quick brown fox jumps over the lazy dog
Body XSmall / Semibold / 10px

Body X Small
The quick brown fox jumps over the lazy dog
Body XSmall / Medium / 10px

tailwind.config.js

```
/** @type {import('tailwindcss').Config} */
module.exports = {
  content: [
    "./src/**/*.{js,jsx,ts,tsx}",
    "./public/index.html",
  ],
  theme: {
    extend: {
      colors: {
        // PRIMARY COLORS (from brand guidelines)
        'grounded': {
          DEFAULT: '#084D41', // Primary dark green
          50: '#E8F5F3',
          100: '#D1EBE7',
          200: '#A3D7CF',
          300: '#75C3B7',
          400: '#47AF9F',
          500: '#199B87',
          600: '#147C6C',
          700: '#0F5D51',
          800: '#0A3E36',
          900: '#084D41', // Brand color
        },
        'livewire': {
          DEFAULT: '#D0F585', // Primary light green
          50: '#F8FEF0',
          100: '#F1FDE1',
          200: '#E8FCC8',
          300: '#DFFAAF',
          400: '#D6F896',
          500: '#D0F585', // Brand color
          600: '#C4F26B',
          700: '#B8EF51',
          800: '#ACEC37',
          900: '#A0E91D',
        },
        'aluminum': {
          DEFAULT: '#EDEFF0', // Light gray
          50: '#FDFDFD',
          100: '#FAFBFB',
          200: '#F7F8F8',
          300: '#F4F5F6',
```

```
  400: '#F1F2F3',
  500: '#EDEFF0', // Brand color
  600: '#E5E7E8',
  700: '#DDDFE0',
  800: '#D5D7D8',
  900: '#CDCFD0',
},

// GRAYSCALE PALETTE
gray: {
  5: '#F0EEEB',
  20: '#D8D7D5',
  40: '#AAAAA7',
  60: '#7F7D7A',
  80: '#54524F',
  100: '#2A2926',
},

// GREENS PALETTE
green: {
  5: '#F0F6F5',
  10: '#D9F0E8',
  40: '#7FB59E',
  80: '#4F7369',
  90: '#084D41',
},

// ORANGES PALETTE
orange: {
  5: '#FFF2F0',
  20: '#FFB5A4',
  40: '#E3703F',
  90: '#773600',
},

// REDS PALETTE
red: {
  5: '#FFEAEA',
  20: '#FF9C80',
  40: '#DF4903',
  80: '#A63500',
},

// BLUES PALETTE
```

```
  blue: {
    5: '#F0F8FB',
    10: '#B8E5F2',
    40: '#1B8BAC',
    90: '#0E4656',
  },
},

fontFamily: {
  'primary': ['PP Neue Montreal', 'Inter', 'system-ui', 'sans-serif'],
  'fallback': ['Inter', 'system-ui', 'sans-serif'],
},

fontSize: {
  // Typography hierarchy based on brand guidelines
  'heading-1': ['48px', { lineHeight: '1.2', fontWeight: '600' }],
  'heading-2': ['40px', { lineHeight: '1.2', fontWeight: '600' }],
  'heading-3': ['32px', { lineHeight: '1.3', fontWeight: '600' }],
  'heading-4': ['24px', { lineHeight: '1.3', fontWeight: '600' }],
  'heading-5': ['20px', { lineHeight: '1.4', fontWeight: '600' }],
  'heading-6': ['18px', { lineHeight: '1.4', fontWeight: '600' }],
  'body-xlarge': ['18px', { lineHeight: '1.5', fontWeight: '400' }],
  'body-large': ['16px', { lineHeight: '1.5', fontWeight: '400' }],
  'body-medium': ['14px', { lineHeight: '1.5', fontWeight: '400' }],
  'body-small': ['12px', { lineHeight: '1.4', fontWeight: '400' }],
  'body-xsmall': ['10px', { lineHeight: '1.4', fontWeight: '400' }],
},

fontWeight: {
  'regular': '400',
  'medium': '500',
  'semibold': '600',
},

spacing: {
  // Additional spacing utilities for consistency
  '18': '4.5rem',
  '88': '22rem',
},

borderRadius: {
  'base': '8px',
  'base-lg': '12px',
},
```

```
      boxShadow: {
        'base': '0 2px 8px rgba(8, 77, 65, 0.1)',
        'base-lg': '0 4px 16px rgba(8, 77, 65, 0.15)',
      },
    },
  },
  plugins: [],
}
```

Security

- Next auth for authentication
- Data Encryption