MICHIGAN STATE UNIVERSITY

Project Plan Presentation

EV Charging Infrastructure Application

The Capstone Experience

Team GM

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From Students…
…to Professionals

Project Sponsor Overview

- One of the world's largest automotive manufacturers
- Michigan based company
- 156,000+ employees worldwide
- Produced over 170,000 EV's in 2025





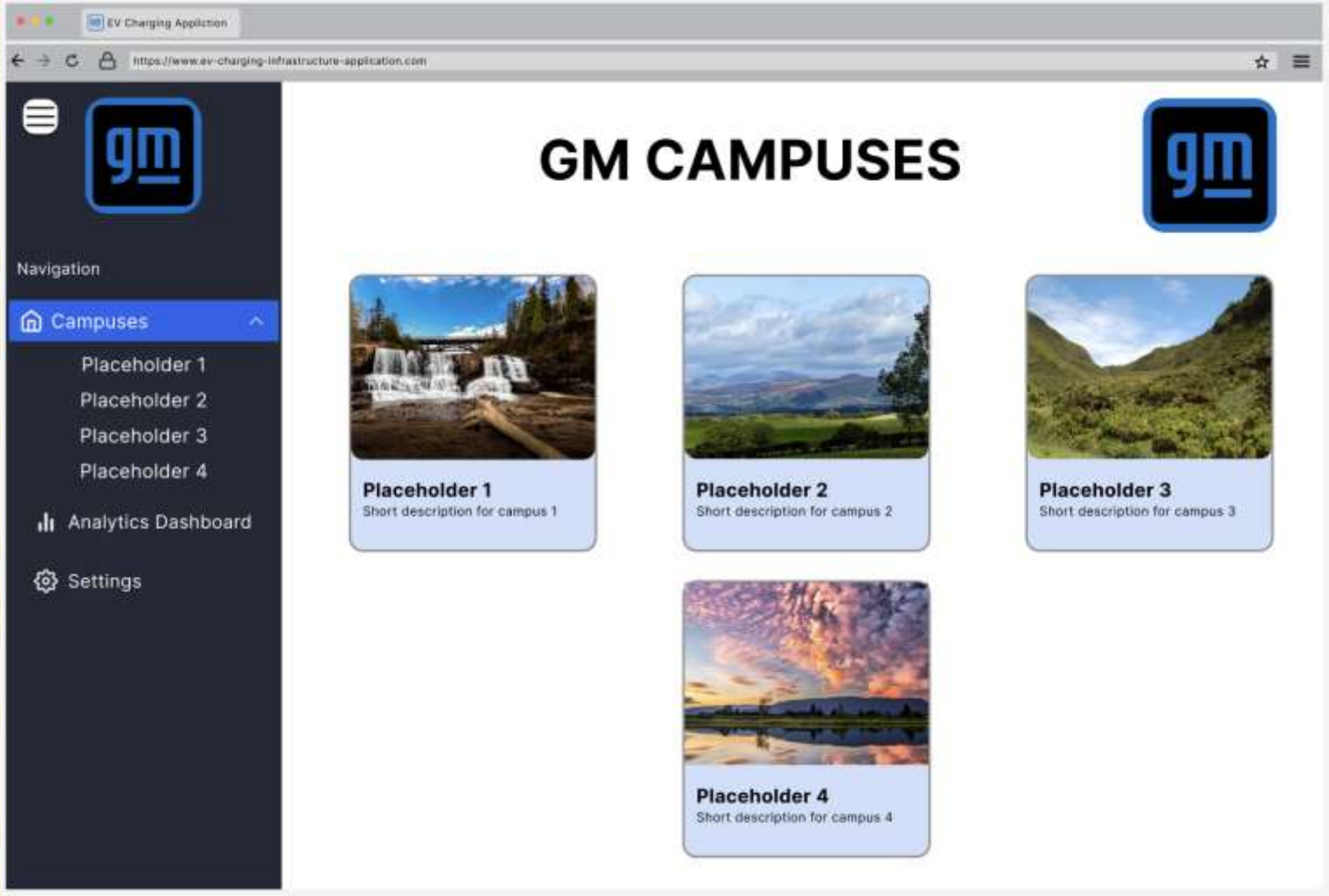
Project Functional Specifications

- Combines EV charging data into a single interactive dashboard
- Gain insights of EV chargers across all GM campuses.
- Improves charging experience for GM employees
- Optimizes limited charging resources

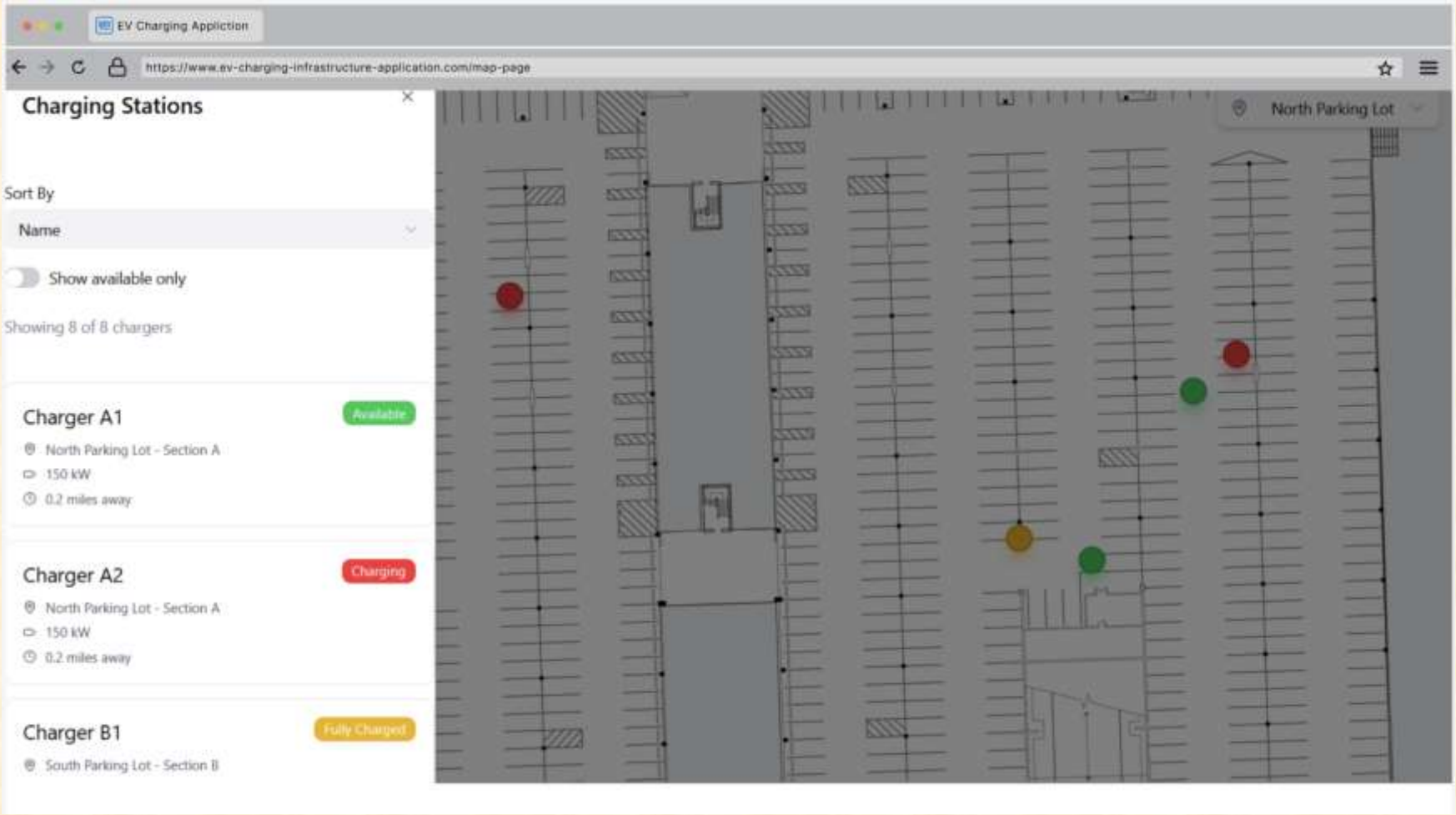
Project Design Specifications

- Campus Selection Dashboard
- Charger Map
- Charger Map Modal
- EV Charger Data Analytics Page
- Settings Modal

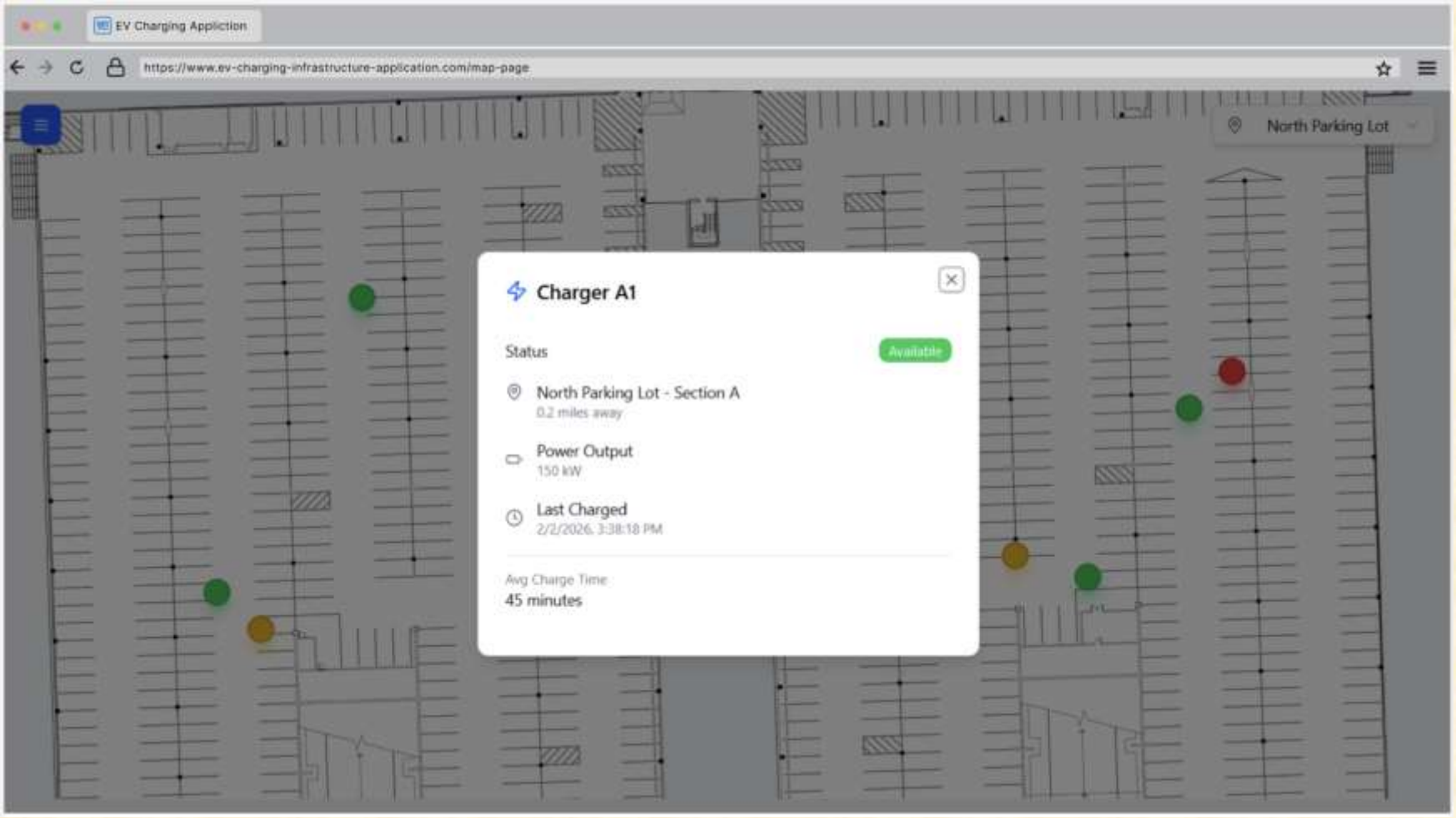
Screen Mockup: Campus Selection Dashboard



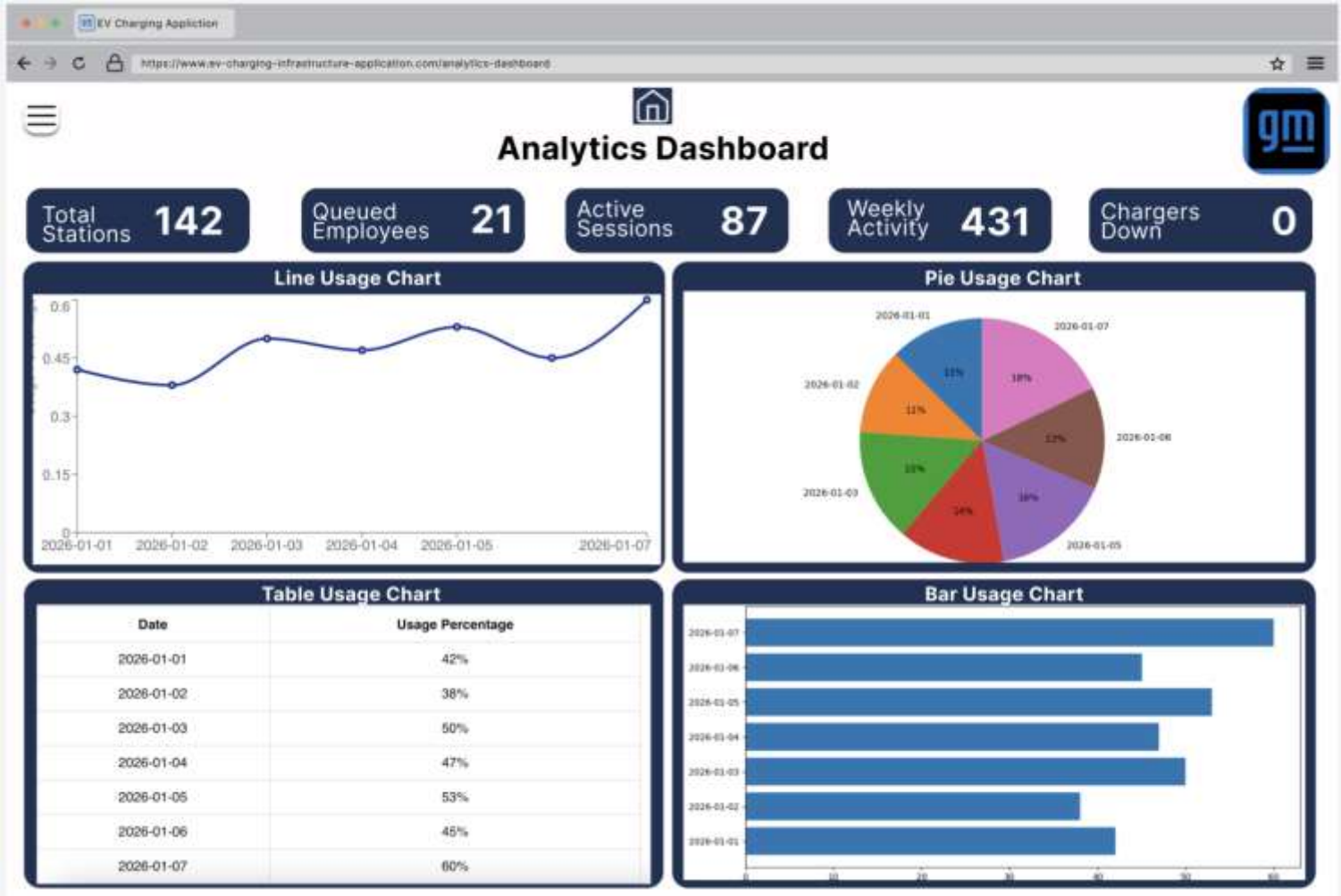
Screen Mockup: Map Page



Screen Mockup: Map Page Modal



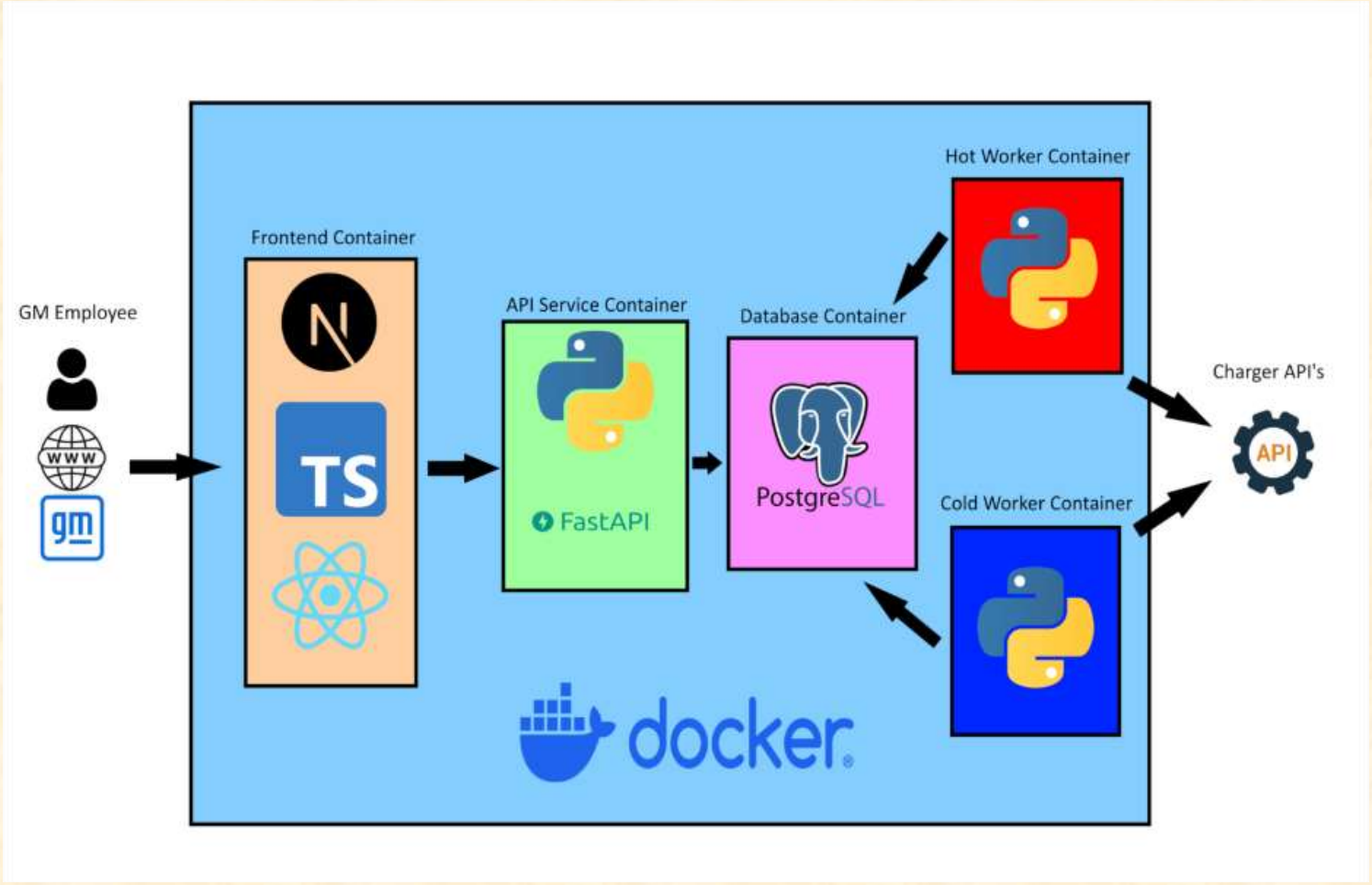
Screen Mockup: Analytics Page



Project Technical Specifications

- Next.js Frontend Container
- Python FastAPI Service Container
- PostgreSQL Database Container
- Python Hot Worker Container
- Python Cold Worker Container

Project System Architecture



Project System Components

- Hardware Platforms
  - Docker engine
  - Charger API servers
- Software Platforms / Technologies
  - Next.js frontend
  - FastAPI endpoints
  - PostgreSQL database
  - Python working containers

Project Risks

- Risk 1: Security
  - Exposing sensitive data and API keys to the public internet
  - Storing keys using environmental variables and requiring authorization to access sensitive data
- Risk 2: Parsing Public JSON
  - Certain EV vendors do not give public API endpoints for grabbing data
  - Take the raw JSON from their public website and parse the data
- Risk 3: Private API Calls
  - Frequent API calls may overload private API servers
  - Implement strict rate limiting strategies to prevent overload
- Risk 4: Real Time Updates
  - Need the frontend to always display the current status of chargers
  - Utilize web socket to enable real time updates

Questions?

