Vehicle to Grid Energy Buy Back Final Proposal

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Problem

- Unprecedented strain on global power grid
  - Can cause blackouts and brownouts in cases where demand exceeds supply
- Having access to power quickly is crucial

- Energy is left locked up within EV batteries
- No current system in place to tap in to this unused energy

Solution

- Vehicle to Grid (V2G) technology can help access unused energy in car batteries

- We will develop an application to serve as an interface between the user and the grid

- Allows user to transfer back energy into the grid and receive compensation

Languages and Hardware

- IOS platform (XCode)
- Swift
- NoSQL
- FireStore

High Level Design

- Use Cases
  - Set up an account
  - Update their information (including payment information)
  - Locate charging stations
  - Receive notifications about grid areas of need
  - Set up a payment system for energy transfers
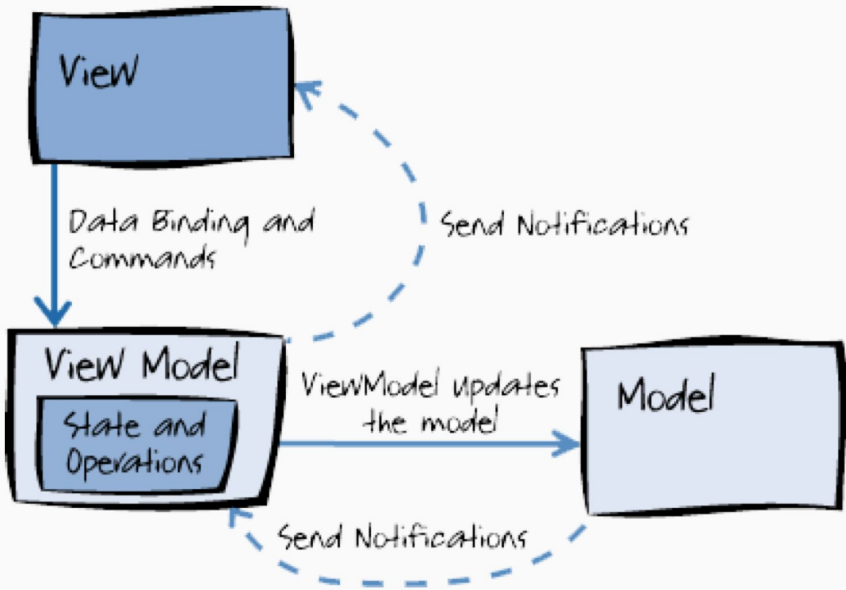- High Level Architecture
  - Model View ViewModel

Main Components and APIs

- Database
  - Locally: MongoDB
  - Cloud: Firestore
- Location Services
  - Google Maps API
- Payment Services
  - Stripe API
- Communication Services
  - Vehicle: Apache Kafka
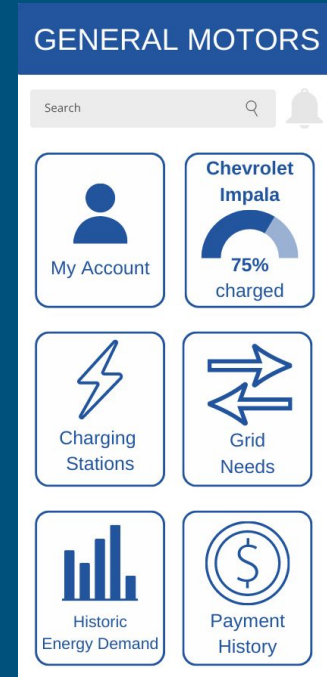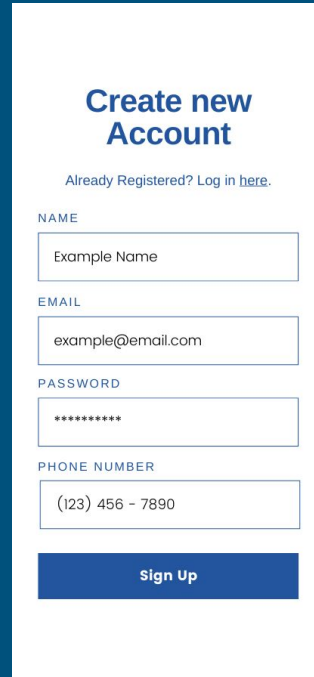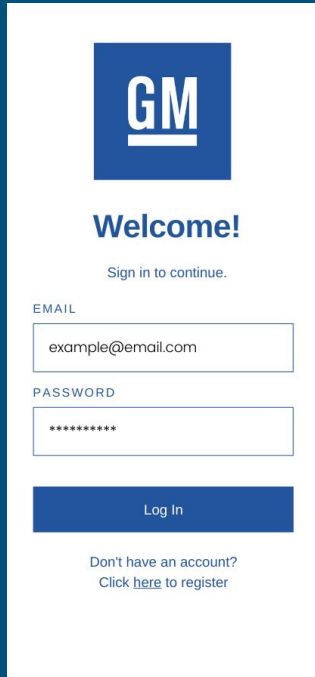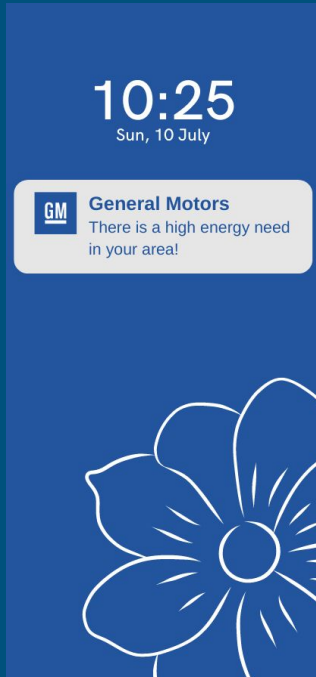 - Energy Grid: Genability API
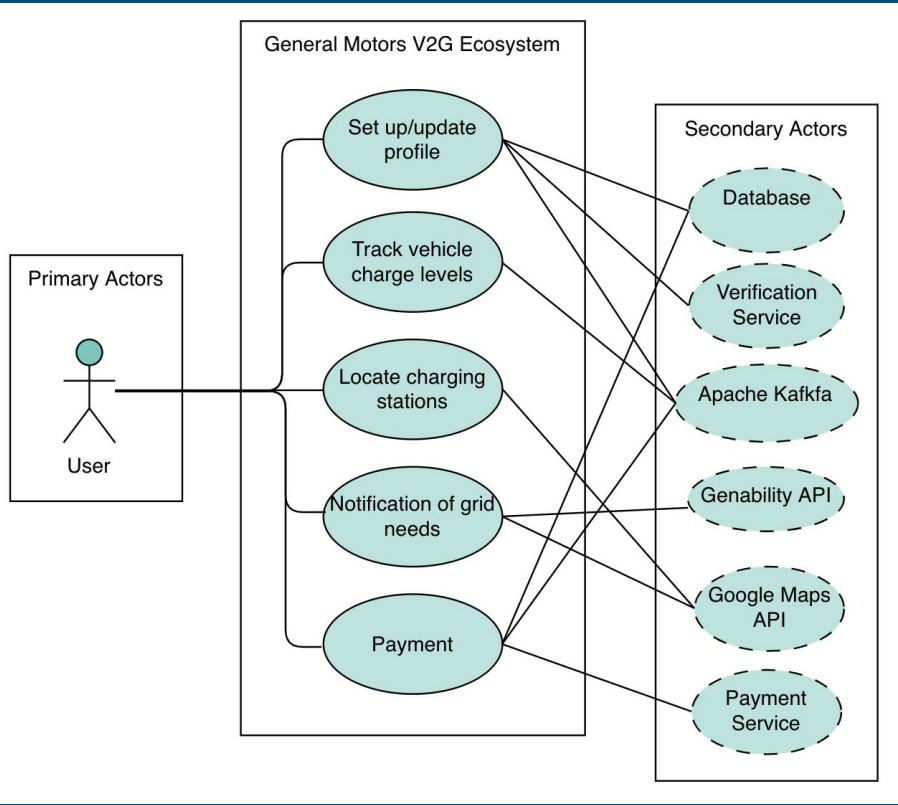
Design

UI Screens Mockup I

UI Screens Mockup II

GENERAL MOTORS

Search 🔍 🔔

My Account

Chevrolet Impala
75% charged

Charging Stations

Grid Needs

Historic Energy Demand

Payment History

←

Payment History

$ You received $10.98
On 10/10/2022
Transaction #: 0011

$ You received $05.67
On 10/12/2022
Transaction #: 0022

$ You received $07.55
On 10/15/2022
Transaction #: 0033

←

Example Name
Email Address

Profile

Name: Example Name

Email: example@email.com

Phone: (123) 456 - 7890

Vehicle

Make: Example Make

Model: Example Model

VIN: Example VIN

←

Example Name
Email Address

Payment

Bank   Example Bank

Routing: Routing Number

Account: 00001111

Update Information ▶

Log Out ▶

←

Notifications

GM There is a high energy need in your area!
Date   Location

GM There is a high energy need in your area!
Date   Location

UI Screens Mockup III

GENERAL MOTORS

Search

My Account

Chevrolet Impala
75% charged

Charging Stations

Grid Needs

Historic Energy Demand

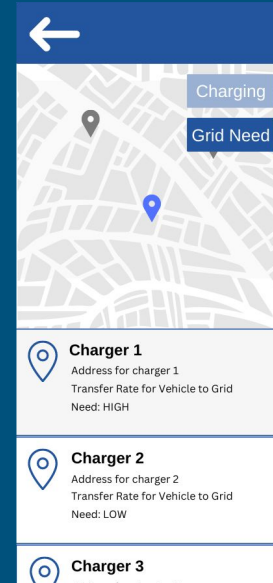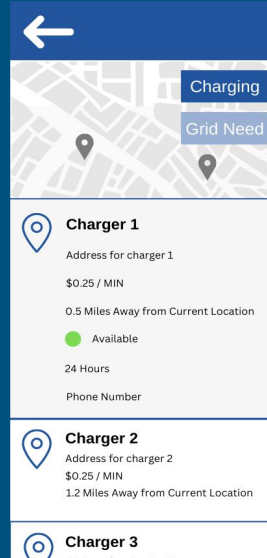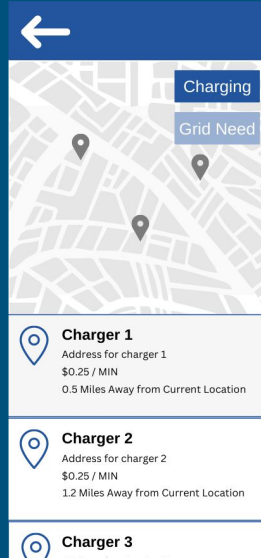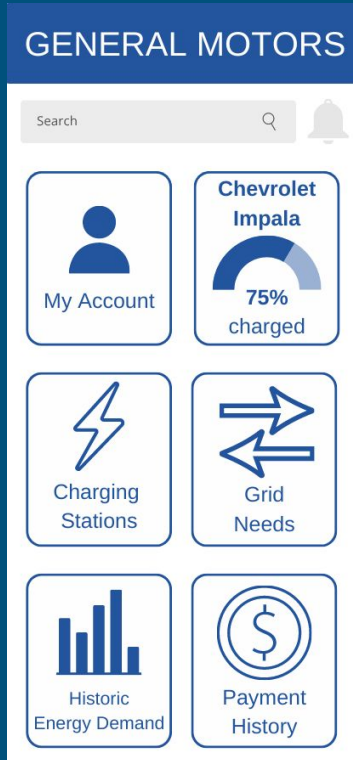Payment History

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Charging | Grid Need

Charger 1
Address for charger 1
$0.25 / MIN
0.5 Miles Away from Current Location

Charger 2
Address for charger 2
$0.25 / MIN
1.2 Miles Away from Current Location

Charger 3

Charging | Grid Need

Charger 1
Address for charger 1
$0.25 / MIN
0.5 Miles Away from Current Location
● Available
24 Hours
Phone Number

Charger 2
Address for charger 2
$0.25 / MIN
1.2 Miles Away from Current Location

Charger 3

Charging | Grid Need

Charger 1
Address for charger 1
Transfer Rate for Vehicle to Grid
Need: HIGH

Charger 2
Address for charger 2
Transfer Rate for Vehicle to Grid
Need: LOW

Charger 3

Charging | Grid Need

Charger 1
Address for charger 1
Transfer Rate for Charger 1
Need: HIGH
0.5 Miles Away from Current Location
● Available
24 Hours
Phone Number

Charger 2
Address for charger 2
Transfer Rate for Vehicle to Grid
Need: LOW

Charger 3

Use Case Example Flow Chart

UI Screens Flow

- Notification
- Login
- Main Screen
- Grid Need
- Locate Charging Station
- Payment History

Thank You!