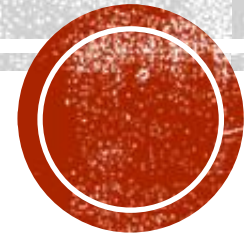# VEHICLE TO GRID ENERGY BUY BACK

Team I –GM-

Capstone I – Preliminary Proposal Report – Fall 2021

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PROBLEM

- In the past several years, electric vehicles (EVs) have become increasingly prevalent. Additionally, infrastructure to support these vehicles, such as chargers, are common in public places. Despite this, there is a lack of technology available to leverage the energy stores of these vehicles. EVs could serve as an additional power source during times of increased energy demand (ex: Power outage Due to natural disaster).

OBJECTIVE

- The objective of this project is to create a mobile application that enables EV owners/users to sell back energy to energy providers. The application would allow EV owners/users to identify areas of need and opportunities for selling back energy at different price points.

KEY CONCEPTS

- Vehicle-to-grid (V2G) technology

  - Technology that allows plug-in electric vehicles to interact with the power grid and return energy to the grid from the battery of the vehicle.

  - Will be used to return energy to the grid when the user wants to.

- Application Programming Interface (API)

  - Software intermediary that allows two applications to communicate with each other.

  - Will be used to gather information for the user such as: Locating nearby charging stations, Pulling charge information from the car, and pulling current electricity prices that the grid is offering.

REQUIREMENT AND USE CASES

- The app must allow the user to:

  - Set up a profile/account

  - Track vehicle charge level

  - Locate charge stations

  - Identify grid energy needs
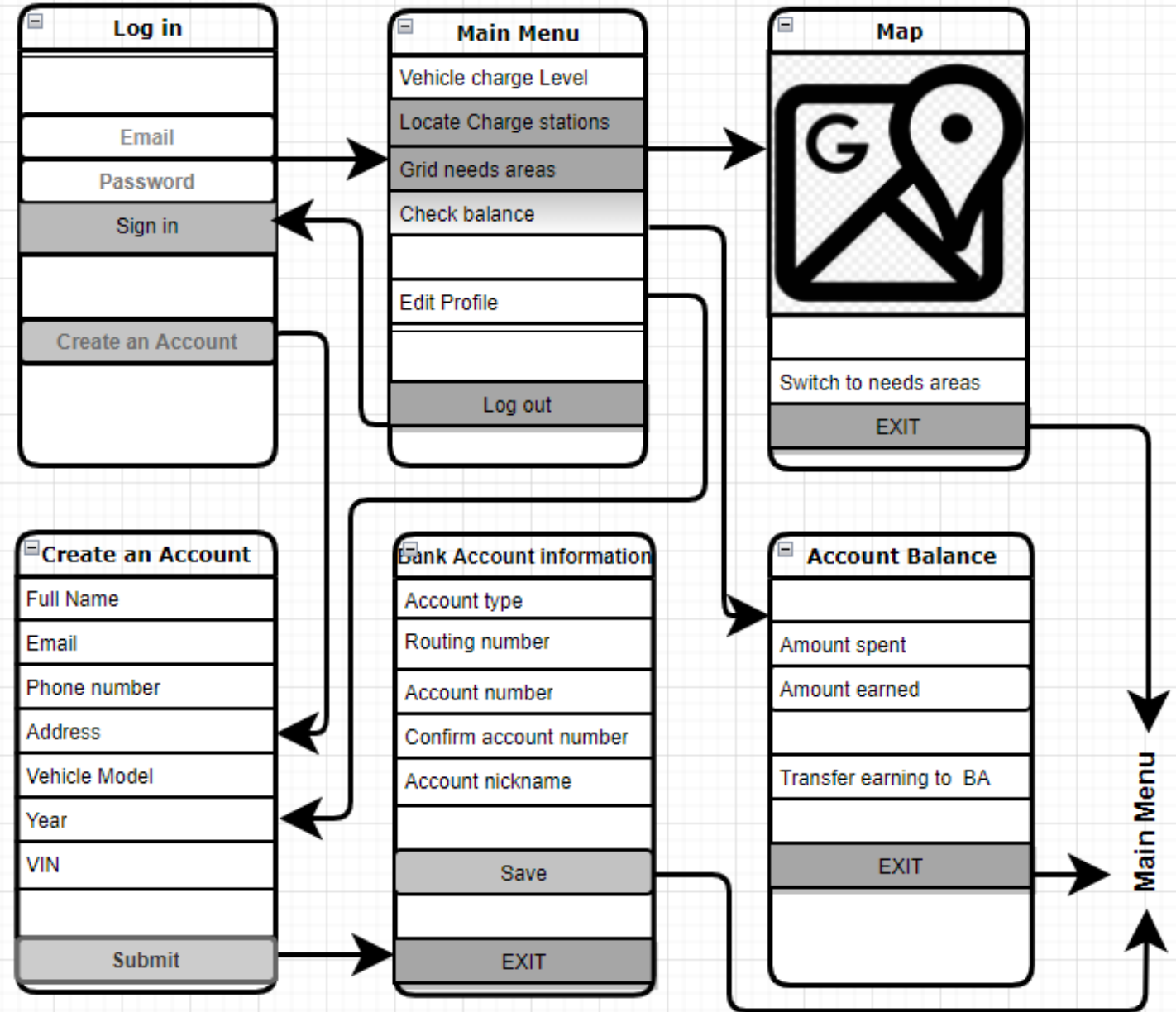
  - Enable payment for services

WHY THIS IS IMPORTANT

- Make the driver's experience easier by providing easy access to vehicles charging stations locations.

- Give the driver the ability to buy and sell energy in an efficient way by providing real-time data through the App portal.

- Give the driver the ability to track their earnings, spending, and Charge level.

USER STORY

Log in

Email

Password

Sign in

Create an Account

Main Menu

Vehicle charge Level

Locate Charge stations

Grid needs areas

Check balance

Edit Profile

Log out

Map

Switch to needs areas

EXIT

Create an Account

Full Name

Email

Phone number

Address

Vehicle Model

Year

VIN

Submit

Bank Account information

Account type

Routing number

Account number

Confirm account number

Account nickname

Save

EXIT

Account Balance

Amount spent

Amount earned

Transfer earning to BA

EXIT

Main Menu

RISKS

- **Insecure Communication**

  ➢ To prevent messages from being intercepted and deciphered we will use transport layer security (TLS), secure connections using session tokens, and industry standard encryption

- **Input validation**

  ➢ To prevent cross-site scripting we will need to validate all inputs to ensure everything a user inputs is as expected.

- **Insufficient Authentication**

  ➢ To protect a user's account and data, we will make sure all authentication requests are handled server-side as well as use multi-factor authentication to validate a user's identity.

GENERAL MOTORS

- American corporation that is the world's largest motor-vehicle manufacturer for much of the 20th and early 21st century.

- Founded in 1908 by William "Billy" Durant.

- GM initially only owned the Buick Motor Company and more than 20 other companies including Oldsmobile, Cadillac,– Germany's Opel, Chevrolet...

- As environmental concerns increase, GM started producing more fuel-efficient petrol engines as well as biofuels, hybrids and fully electric.

- In 1996 GM rolled out the EV1, the first mass-produced electric vehicle of the modern era.