Alpha Presentation
Remote Energy Distribution Payment Platform

The Capstone Experience
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Spring 2022
Project Overview

• The issue of grid electricity in Cameroon and other African nations.
  ▪ 55% has access to the electrical grid.
  ▪ Only 17% in rural areas.

• Off-grid energy exchange marketplace to allow for the access of reliable, off-grid electricity.
  ▪ Phase 1 - Device Design and Prototype (Completed by FS21 ECE Capstone)
  ▪ Phase 2 – SMS-based Payment System Design and Prototype
System Architecture

Diagram showing system architecture with components such as SMS, Web App, Arduino Charge Station, Framework/API (Express, MongoDB, Twilio, Stripe, Firebase), Server, App Frontend (HTML, CSS, JS, Pug, Heroku).
SMS Chat

Sent from your Twilio trial account - Your transaction has been completed. Your account has been charged: 1. Your remaining balance is: 199 FCFA

Sent from your Twilio trial account - Welcome to the Bpower charging station. How much do you plan on spending in FCFA? (ex: 20, 45, etc.)?

Sent from your Twilio trial account - Success! To begin charging, please plug in your device and enter the following code: 500011. When you are complete, please text the code from the LCD display to this number.

Sent from your Twilio trial account - Transaction already started, please enter the amount you wish to spend.
Account Balance

Welcome, therkels
Email: therkels@msu.edu
Phone: 4193764764

Current Balance
169
FCFA

History
<table>
<thead>
<tr>
<th>Date</th>
<th>Charge Station</th>
<th>Amount (FCFA)</th>
<th>Energy (kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>02/15/22</td>
<td>aqua</td>
<td>30</td>
<td>100</td>
</tr>
</tbody>
</table>
## User Information

![User Information]

### Display User Information from Database

<table>
<thead>
<tr>
<th>Username</th>
<th>Email</th>
<th>Phone</th>
<th>Balance</th>
<th>Role</th>
<th>View Account</th>
<th>Delete Account</th>
</tr>
</thead>
<tbody>
<tr>
<td>admin123</td>
<td><a href="mailto:admin@no-reply.com">admin@no-reply.com</a></td>
<td>8888888888</td>
<td>570</td>
<td>admin</td>
<td>[View Account]</td>
<td>[Delete Account]</td>
</tr>
<tr>
<td>app123</td>
<td><a href="mailto:st@wmail.com">st@wmail.com</a></td>
<td>2222222222</td>
<td>50</td>
<td>user</td>
<td>[View Account]</td>
<td>[Delete Account]</td>
</tr>
<tr>
<td>mearscon</td>
<td><a href="mailto:mearscon@msu.edu">mearscon@msu.edu</a></td>
<td>8104296050</td>
<td>50</td>
<td>user</td>
<td>[View Account]</td>
<td>[Delete Account]</td>
</tr>
<tr>
<td>applesea</td>
<td><a href="mailto:stroste3@msu.edu">stroste3@msu.edu</a></td>
<td>2486866636</td>
<td>0</td>
<td>user</td>
<td>[View Account]</td>
<td>[Delete Account]</td>
</tr>
<tr>
<td>jakeriggs16</td>
<td><a href="mailto:jaketriggs16@gmail.com">jaketriggs16@gmail.com</a></td>
<td>7346254425</td>
<td>50</td>
<td>user</td>
<td>[View Account]</td>
<td>[Delete Account]</td>
</tr>
<tr>
<td>avery_lyu</td>
<td><a href="mailto:sslyu@gmail.com">sslyu@gmail.com</a></td>
<td>8458913710</td>
<td>100</td>
<td>user</td>
<td>[View Account]</td>
<td>[Delete Account]</td>
</tr>
<tr>
<td>therkels</td>
<td><a href="mailto:therkels@msu.edu">therkels@msu.edu</a></td>
<td>4193764764</td>
<td>169</td>
<td>user</td>
<td>[View Account]</td>
<td>[Delete Account]</td>
</tr>
<tr>
<td>smmartin44</td>
<td><a href="mailto:mart2035@msu.edu">mart2035@msu.edu</a></td>
<td>3134000979</td>
<td>50</td>
<td>user</td>
<td>[View Account]</td>
<td>[Delete Account]</td>
</tr>
</tbody>
</table>
Stripe Web Checkout

![Stripe Web Checkout](image-url)
What’s left to do?

• SMS handling
• Web application views
• Admin analytic/management controls
• Station/user communication protocol
• Generalize payments and currency translation
Questions?
How does the SMS work?

The diagram illustrates the SMS process:

1. **Stage 1**: Check customer balance.
2. **Stage 2**: Input code into charger.
3. **Stage 3**: Update customer balance, end transaction.

The process begins with the customer text server number, moves to inputting the code into the charger, and finally updates the balance and ends the transaction.