Surendar Singh R

Address: Chennai, Tamil Nadu
Phone: +91 6383193452
Email: surendarsingh2002@gmail.com
Github: https://github.com/surendarsingh
Portfolio: Surendar_Developer.pdf

Current Occupation: Student (Final Year - BTech' 24)
Institute: Anna University, Chennai

Technical Skills: Full Stack Developer *(MERN Stack)*, REST API *(Expert)*
Backend: NodeJS *(Expert)*, Python *(Intermediate)*, C++ *(Intermediate)*
Frontend: HTML, CSS, JS *(Expert)*, ReactJS *(Intermediate)*
Database: MongoDB *(Expert)*, SQL *(Expert)*, Redis *(Intermediate)*
Technologies: Docker / Docker Compose *(Expert)*, Kubernetes *(Novice)*, Postman API *(Expert)*
Cloud: Azure *(Expert)*, AWS *(Novice)*

Beckn Energy Interface

June 10, 2023

Summary

Implementing API Calls for Beckn Energy Interface which run on Beckn Protocol Sandbox built on top of Unified Energy Interface (UEI) for a one-stop solution for Regular users and Fleet Driver for easy accessing the EV charger ecosystem to charge their Batteries from any EV Charging Station without the need for downloading 42+ Charge Point Operators (CPO) apps. This will improve the EV user experience due to interoperability and ubiquitous payments and can potentially accelerate the growth and need for EVs in India.

Project Details

Project Understanding

The Beckn Energy Interface is an API that emulates the behavior of an Open Energy Network like the Unified Energy Interface (UEI). BAPs can build rich integrated experiences by combining services offered by multiple BPPs on the network. BPPs can make complex products by analyzing the nature of input from various BAPs.

Problems to Solve

1. One-Stop platform to access, charge and pay without downloading all different CPO apps (i.e., closed loop system).

2. Discovery of different CPOs and their Charger Type and status availability.

3. Making charger interoperability and ubiquitous payments more efficient and convenient.

4. Discovery of newly opened EV charging stations without the need for additional investment in building a new mobile application and marketing their presence.

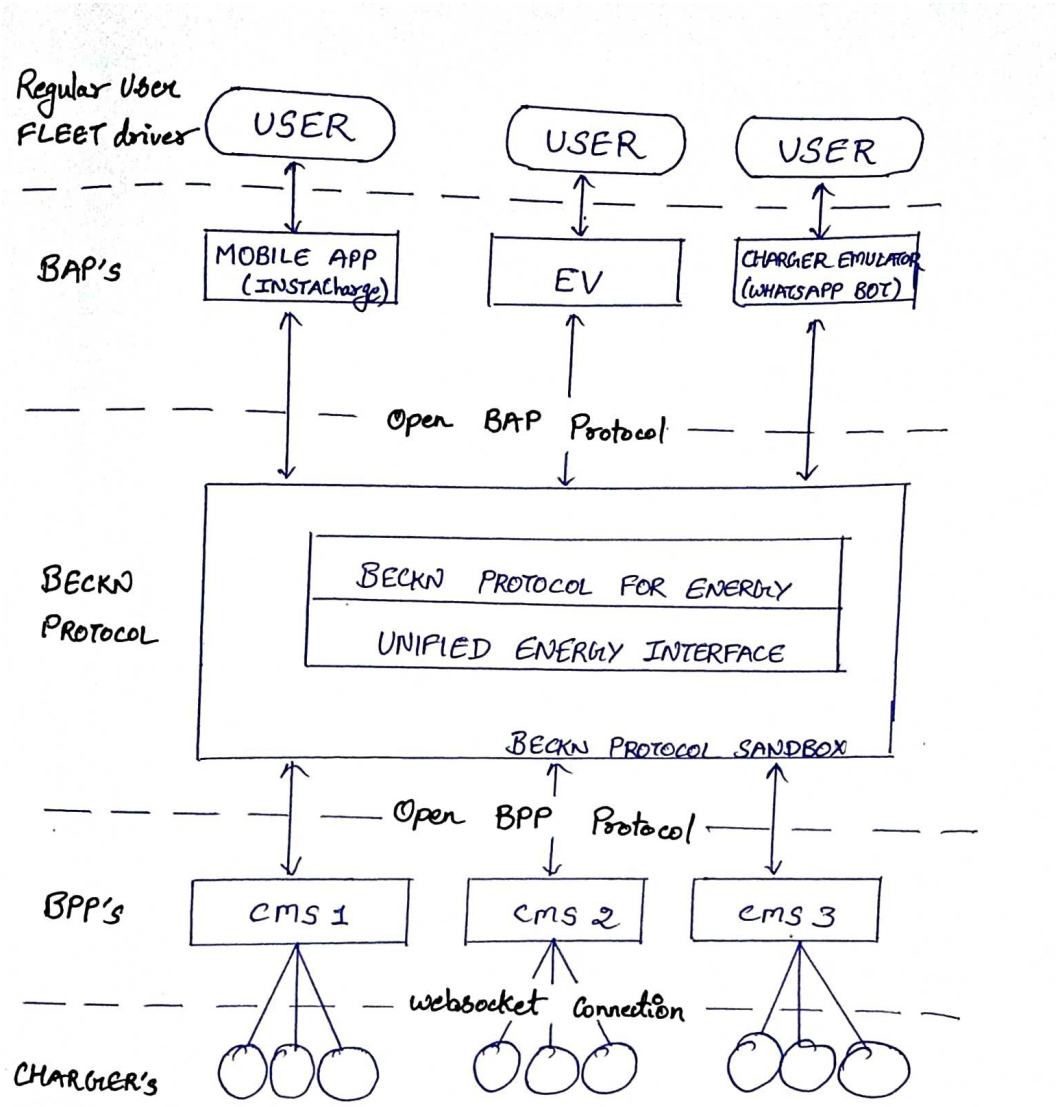
Solution Proposed

This can be solved by creating a decentralized EV charging network called Unified Energy Interface (UEI), (similar to UPI) built on top of Beckn protocol which solves the problem of an interoperable open protocol specification that has been utilized by ONDC (Open Network for Digital Commerce), UHI (Unified Health Interface) and KOMN (Kochi open mobility network). Beckn Energy Interface does not change the way charger to backend server (CMS) communications are being done today, they will remain as is and up to the Charge Point Operator.

Beckn Energy Interface is an API that emulates the behavior of UEI built on top of the Beckn Protocol Sandbox. BAPs can build rich integrated experiences by combining services offered by multiple BPPs on the network. BPPs can build complex products by analyzing the nature of input from multiple BAPs.

Note: Beckn Energy Interface will enable large-scale democratization of energy transactions in India by providing a level playing field for large and small entrepreneurs that set up energy dispensing devices today and in the future.

Project Architecture



Project Implementation

The Beckn Energy Interface is implemented majorly in these 3 Use Cases:

1. Beckn energy reference application
2. Instacharge application (BAP - Mobile Application)
3. Charger Emulator (Pulse Energy WhatsApp application)

Features Implementation

1. Beckn-protocol compliant catalogs across multiple EV-charging services
2. BPP endpoints: search, select, init, confirm, status, update, track, cancel, rating, support
3. BAP endpoint : on_search, on_select, on_init, on_confirm, on_status, on_update, on_track, on_cancel, on_rating, on_support
4. BG endpoint: Search
5. Registry endpoints: lookup
6. EV Charger emulator

Milestones

Every week, a regular meeting to plan and documentation is prepared, and after the coding part is complete, Testing, Investigation, and documentation update will proceed at the end.

1. Week - 1: July 1 - July 6, 2023

Understanding Beckn protocol for energy & Configure Beckn Sandbox

- Introduction Meeting and Project Implementation in Detail
- Understanding of different use cases, UEI, Beckn Protocol, and Sandbox
- Setup of Beckn Protocol Sandbox
- Configure Sandbox to support EV Use cases
- Create API specifications to sandbox
- Setup of Postman with Mobility Use Cases
- Finalizing User Input and Output Data Structure (JSON Structure)
- Starting with Initial Code Base and Preparing Documentation

2. Week - 2: July 7 - July 14, 2023

Development of search / on_search API

On BEI, when a user searches for a charger, the BAP that the user uses can broadcast the search query to all participating CPOs in the Beckn network. CPOs connected to the

network shall respond with the charger details listed below. The details will provide the user with the necessary data to make a decision.

/search to BPP from BAP: Setup Postman Script for the following parameters:

```
// /search - POST - goes to BPP from BAP
{
    userName: "User Name 123",
    UserId: UUID_user,
    latLong: {lat, long},
    vechicalName: "Vechical Name 123",
    vehicalID: UUID_vechical,
    radius: 5, // in Kilometer
    chargerType: "AC", // AC or DC
    connectorType: "15A", // 15A / AC001 / DC001 / CCS2 / Type 6(Ola) / Ather
    powerRating: 15, // in kW Power
    chargerTariff: 12.5 // < 10 / 15 Rs per unit
}
```

/on_search to BAP from BPP in response to */search:* returns an array of available chargers nearby the radius of Lat Long of the user request based on user type (Regular User / Fleet Driver)

```
// /on_search - response to /search to BAP from BPP
{
    {
        chargerName: "Jio BP",
        chargerID: UUID_charger
        chargerAddress: "Adrress of the charger",
        latLong: {lat, long},
        availabilty: "Available", // Available, Unavailable, Occupied, & Faulted
        connectionAvailabilty: 2, // Number of connectors available on the charger
        chargerType: "AC", // AC or DC
        connectorType: "15A", // 15A / AC001 / DC001 / CCS2 / Type 6(Ola) / Ather
        powerRating: 15, // in kW Power
        chargerTariff: 12.5 // < 10 / 15 Rs per unit
    },
    {...}, {...}, ...
}
```

3. Week - 3: July 15 - July 21, 2023

Development of select / on_select / init / on_init API

Once the user selects a charger of their choice, the Beckn network will connect the user directly to the CPO and facilitate sending the start and stop commands back and forth between them. A similar working model applies for booking a charger.

/select to BPP from BAP: Setup Postman Script for the following parameters:

```
// /select - POST - goes to BPP from BAP
{
    userName: "User Name 123",
    UserId: UUID_user,
    latLong: {lat, long},
    vechicalName: "Vechical Name 123",
    vehicalID: UUID_vechical,
    selectedCharger: chargerID,
    chargeType: "Charge Now", // Charge Now or Researve
    chargeBy: "Amount", // Soc or Units or Amount or Time
    units: 50, // 50Rs for Amount or 50 Units for Units
}
```

/on_select to BAP from BPP in response to */select:* returns quote with the submission ID:

```
// /on_select - response to /select to BAP from BPP
{
    estimatedQuote: 50, // Estimated Quote
    submissionID: UUID_submission, // Unique Submission ID
    paymentStatus: "Unpaid" // Initially Payment is Unpaid
}
```

/init to BPP from BAP: Setup Postman Script for the following parameters:

After Payment Completion, Transaction-ID provided by the bank will be sent

```
// /init - POST - goes to BPP from BAP
{
    userName: "User Name 123",
    UserId: UUID_user,
    latLong: {lat, long},
    vechicalName: "Vechical Name 123",
    vehicalID: UUID_vechical,
    selectedCharger: chargerID,
    submissionID: UUID_submission, // Unique Submission ID
    transactionID: Bank_TransactionID // Produced after Payment Done
}
```

/on_init to BAP from BPP in response to */inti:* returns payment status with charger confirmation and usage:

```
// /on_init - response to /init to BAP from BPP
{
    submissionID: UUID_submission, // Unique Submission ID
    paymentStatus: "Paid", // Payment is Verified
    chargerID: UUID_charger,
    chargingStatus: "Charge Now" // Charge Now or Reservation Confirmed
}
```

Once the charging session is complete, the CPO can hand over the UPI ID tied to their charger and the user can pay directly to the UPI ID without having to pay for any other transaction cost. If UPI is not available, then the participating CPOs can work directly with the UEI app provider to conduct reconciliation.

4. Week - 4: July 22 - July 31, 2023

Development of confirm/ on_confirm/ status/ on_status/ update/ on_update API

Similarly, the following 4th week to complete the API calls proceed with Testing, investigation, and documentation for confirmation, Status, and Update API.

5. Week - 5: August 1 - August 6, 2023

Development of track / on_track / cancel / on_cancel API

Similarly, the following 5th week to complete the API calls proceed with Testing, investigation, and documentation for tracking and canceling API.

6. Week - 6: August 7 - August 14, 2023

Development of rating / on_rating / support / on_support API

Similarly, the following 6th week to complete the API calls proceed with Testing, investigation, and documentation for rating and support API.

7. Week - 7: August 15 - August 20, 2023

Understanding charger emulator and Integration

- Detail Discussion on Charger Emulator Implementation in Pulse Energy WhatsApp application
- Understanding the requirement and Strategy
- Configure Sandbox to support Charger Emulator
- Setup of Initial Charger Emulator
- Finalizing User Input and Output Data Structure
- Starting with Initial Code Base and Preparing Documentation

8. Week - 8: August 21 - August 31, 2023

Development of charger emulator

- Development of a charger bot (WhatsApp) that emulates various types of EV-charging stations and hubs
- Testing with different Inputs and edge cases
- Improving the User Experience mainly for Fleet Drivers
- Investigation and Documentation completion
- Completing the Project Implementation and Features

Use Cases

1. BAP - Mobile Application

   A mobile Application that connects to Beckn Network underlining to Unified Network Interface(UEI) which connects to every CPO and accesses their charging point without the need of downloading additional applications related to each CPO.

2. BAP - Charger Emulator (Eg. Whatsapp Bot)

   Easy and very smooth integration of the beckn network with Charger Emulator which runs on Whatsapp and seamlessly connects the regular users and fleet driver to every CPO without needing to download any application.

Availability

I will dedicate 49 Hours per week (5 hrs/ day on Weekdays & 7 hrs/ day on Weekends) from July to August to complete this project.

I have my summer holidays going till July. I'm additionally doing a remote Internship which will require 2 hrs/ day.

Personal Information

About Me

I'm interested in building and developing large-scale projects which help several people to take advantage of technology and the internet around us. From School, I was learning to code via youtube/Udemy and do small projects. In College, I learn to write production-ready code to implement real-time data streaming and improve the scalability of applications via microservices.

My motivation to apply for this C4GT Project

I wanted to get into Open Source Development and contribute to existing projects for a long time. But this project is starting from scratch and that motivates me enough to go build an application that will revolutionize a behavioral change in public to adopt EVs and accelerated the improvement in the EV industry.

My previous Experience

1. **Project:** Remote Compiler

   GitHub Link: https://github.com/SurendarSingh/Remote-Compiler

   Description: A Horizontal scalable online code compiler API supporting 4 programming languages (Java, C, C++, Python) for competitive programming and coding interviews. This service executes your code remotely using docker containers to separate environments of execution

   Tech Stack: NodeJs, Python, Docker Compose, RabbitMQ, Redis, Postman API

2. **Project:** Communication Skill Assessment

   GitHub Link: https://github.com/SurendarSingh/Voice_Assesment

   Description: An online Communication Skill Assessment platform where Students can test their Speaking and Listening Skills. This platform can be used in online hiring rounds for Communication tests.

   Tech Stack: NodeJs, EJS, SQL, Google TTS API

My Open Source Contribution

1. **Project:** Many Password

   PR Link: https://github.com/many-passwords/many-passwords.github.io/pull/14

   Description: I added a contact form that helps the user to contact the admin directly via email by implementing a form submit API.

   Tech Stack: HTML, CSS, JS, FormSubmit API

2. **Project:** Personality Development Association Website

   PR Link: https://github.com/pda-mit/PDA-Website/pull/3

   Description: I was a maintainer for PDA Organizer to manage PR and issue Pages where I initially started the Implementation of the PDA website and started setting up the code base by Nodejs with Express and EJS.

   Tech Stack: NodeJs, ExpressJs, EJS