SMART INDIA HACKATHON 2022

Team Insiders

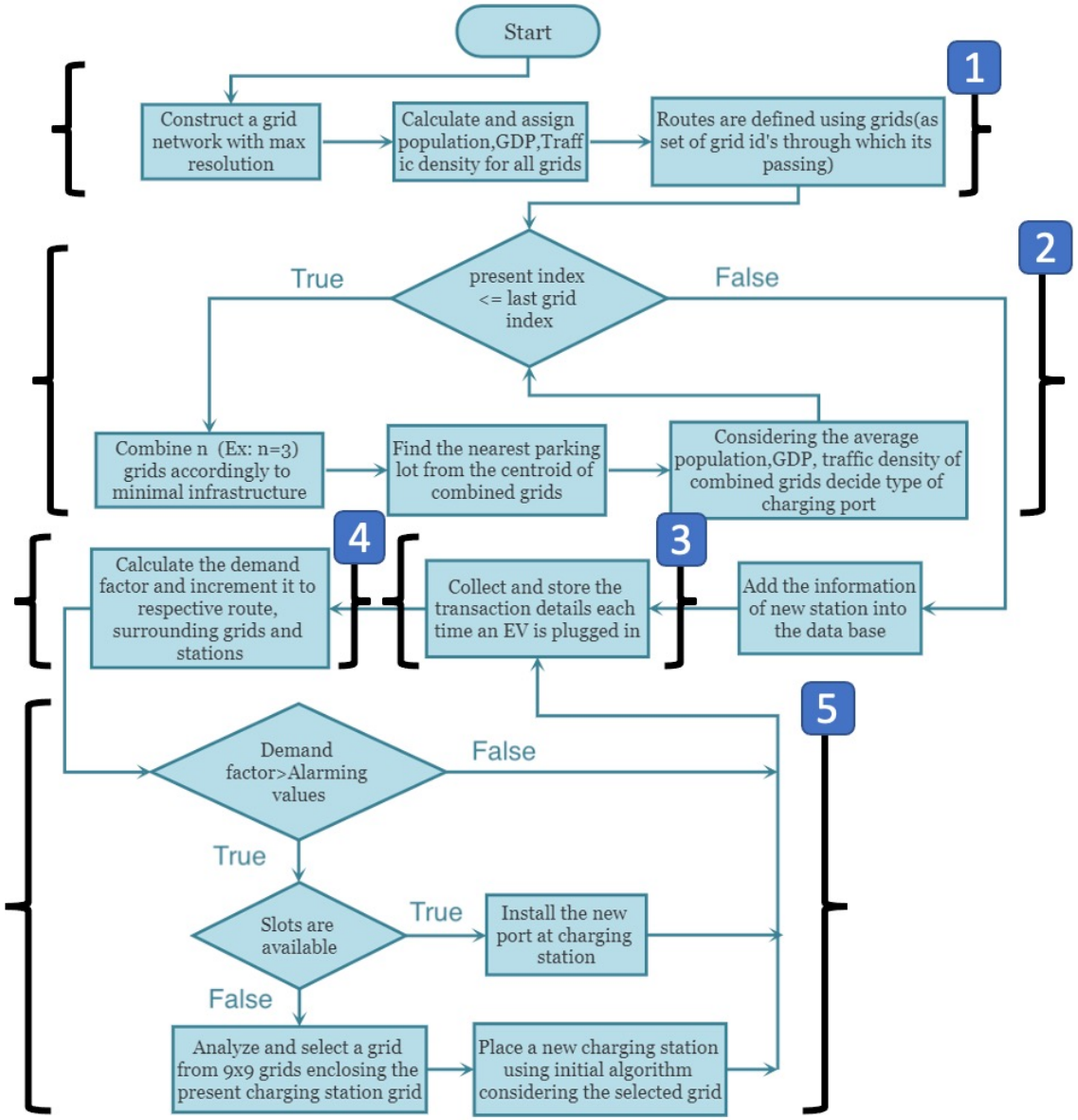
The Gist of Problem Statement

- Location analysis of charging infrastructure that aids the EV rollout plan by government ministries.
- Targeted usage areas are cities with a population > 4 million
- The Core of the problem is Demand and Supply

Basic Details of the Team and Problem Statement:

Ministry Name:	Ministry of Housing and Urban Affairs
PS Code:	BV806
Problem Statement Title:	Suggest a redefined solution to help cities locate EV(Electric Vehicles) charging infrastructure.
Team Name:	Insiders
Team Leader Name:	Chandrashekar Ollala
Institute Code (AISHE):	C-26162
Institute Name:	Vasavi College of Engineering, Ibrahim Bagh
Theme Name:	Smart Vehicles

Unified Flowchart



Idea/Approach Details

We will be developing a unified management system software for the EV sector that handles the problem of demand and supply in an organised manner.

1. **Initialization :**
   - The City is divided into grids of equal size.
   - Data required (like population, availability of land, vehicle data, public transport routes etc..) is procured from government and other sources and analysed at the grid level.
   - Routes are defined on the area of interest using roads shapefile.
2. **Deploying Minimal Infrastructure:**
   - Aim: To Decrease Charge Anxiety (Fear of charge running out)
   - Locating existing EV charge stations and Deploying new EV charge stations in every locality where there are no charge stations to reduce Charge anxiety.
3. **Tracking Demand:**
   - Every time a vehicle charges at a station, details of the charge are stored in database with the following attributes

   {Station ID, Transaction ID, Vehicle number, Charge time, Energy charged, Bill details}
4. **Real-time Analysis of vehicle data :**
   - Based on the transaction details, the demand factors at Station level and Grid level are updated in the database.
   - Notifying admins at different levels if there's a need for deploying new infrastructure.
5. **Resolving the supply issue:**
   - When demand reaches a threshold value, areas with high demand are selected for increasing ports (or) deploying new stations.
   - A new station needs to be installed at an optimal location considering adjacent station's demand also.

Use Cases:

User Type: Celestial Admin (Government authorised official):

- Can define the minimal infrastructure (say 1 station per 4 sq. km)
- Can view the real-time traffic and energy usage insights at a Station/ Area / Grid / Route.
- Can approve the request from zonal admin for infrastructural changes

User Type: Zonal Admin (Authorised personnel of charge station)

- Can view the Usage and occupancy statistics, energy insights of each slot in that station.
- Will get prompted, to send a request for infrastructural development when daily demand crosses a threshold value.

User Type: Vehicle Owner- Common People (Future Scope):

- Can view the availability of slots and schedule a charge at any station in his/her way.

Show Stoppers:

- Achieving high precision and accuracy to find the optimal location to install EV station through QGIS
- Being able to determine the priority of location efficiently by Defining routes using grid id's.
- Creating heatmaps to get visual insights of traffic and energy effectively to users.
- Real-time analysis of demand to make decision-making simpler.
- A Centralized database of all the stations helps in optimal usage of resources and sharing between stations.

Technology Stack:

- Quantum Geographic Information System (QGIS) for location analysis of Geospatial data.
- MySQL for Database
- Python Flask for handling API requests
- Flutter and Angular for Frontend

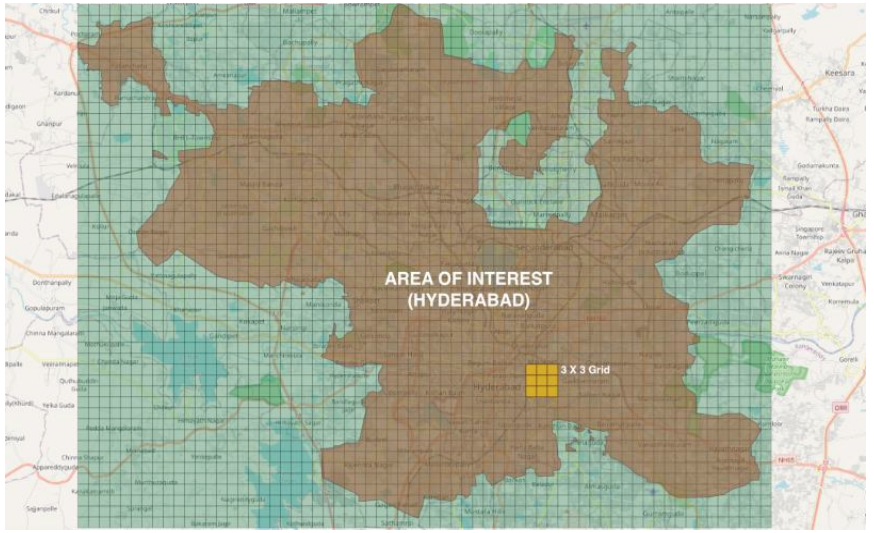


Fig-1 Grids network laid on Test City

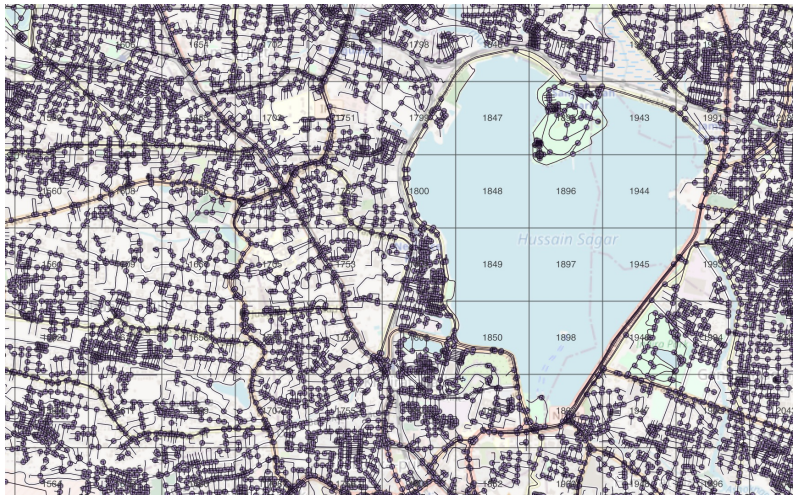


Fig-2 Number of Road Intersection onto grid's attributes to get traffic density

Note- Similarly centroids of budling are used to get population density at the initialization step

Team Members Details

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REFER DOCUMENTATION FOR DETAILED SOLUTION