EVCA

(Electric Vehicle Charging Assistant)

- Ruchika Sharan

ABSTRACT:We, as students of **Indian Institute Of Technology (H.P.)**, understand our responsibility to use our computer science skills to put some steps forward for the noble cause of environmental health improvement. So we have focused on creating a software based solution for the gigantic problem of air pollution along with enhancing the use of sustainable energy resources in place of non-renewable resources like fossil fuels

Introduction

This is the era of technology and sciences. The world is fastly growing into an advanced version of itself. But this growth has also led to some negative effects on our environment.

As a part of the technological and scientific society, it is therefore our responsibility to take into account the adverse effects of this growth on the environment. We need to come up with some ways to deal with the environmental problems.
pollution is one of the major problem these days.

Call For Change

Union Ministry of Environment, forest and climate change reckons that the magnitude of CO2 emissions generated by the transportation sector till 2010 stood at 188 Metric Tonnes(MT), 87% of which was contributed by the road transport alone.

Petroleum Planning and Analysis (PPA) cell estimated in 2014, that the transportation sector commanded a staggering 70% and 100% of diesel and petrol demands respectively.

It can also be deduced from the PPA's estimates that transportation sector is the largest consumer of oil, for 40% and 13% of oil consumption can be attributed to diesel and petrol respectively, which in turn is a heavy strain for the Indian economy since 80% of oil demand in India is met through imports.

Electric Vehicles can Salvage the Solution

Transition to Electric Vehicles from traditional oil fueled vehicles will kill two birds with one stone- 1. Resolve the problems of increasing oil imports 2. Minimize air pollution levels.

Electric Vehicles have the following advantages over conventional gasoline powered vehicles:

Energy Efficiency exhibited by EVs is 3 to 3.5 times more than that of traditional internal combustion engine-based vehicles.

The emission profile of EVs has an edge over traditional automobiles as they have negligible emission content, thus EVs help bring down the degree of pollution.

Measures Taken in the Direction

Efforts at International Level

Financial and Non-Financial incentives offered for purchase of EVs: Various countries are using financial and non-financial incentives like- upfront reductions in prices of EVs, tax exemptions, subsidies, emission testing exemptions, availability of public chargers, as stimulants to encourage people for EV adoption.

EV30@30 Campaign: This campaign has been initiated globally with an aim of achieving 30% sales share of EVs by 2030. Netherlands, Norway, Ireland are the global forerunners in sales of EVs.

Steps Taken by India

To build a sustainable EV ecosystem initiatives like- National Electric Mobility Mission Plan(NEMMP) and Faster Adoption and Manufacturing of (Hybrid &) Electric vehicles in India(FAME India) have been launched by India.

NEMMP: It was launched in 2013 with an aim to achieve national fuel security by promoting hybrid and electric vehicles in the country. There is an ambitious target to achieve 6-7 million sales of hybrid and electric vehicles year on year from 2020 onwards.

FAME: FAME India Scheme [Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India] was launched in 2015 with the objective to support hybrid/electric vehicles market development and manufacturing ecosystem. The scheme has 4 focus areas i.e. Technology Development, Demand Creation, Pilot Projects and Charging Infrastructure.

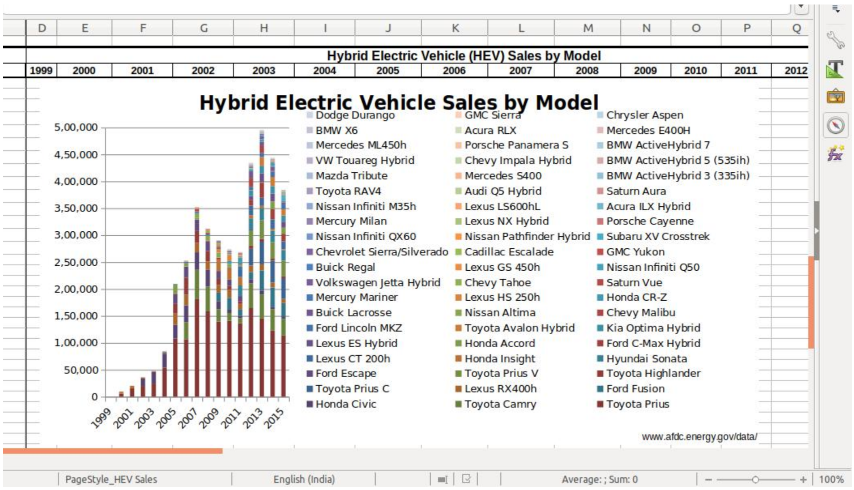
Several states' transport utilities have procured over 500 electric buses in a bid to incorporate EVs in the system.

Organisation like Bureau of Indian Standards(BIS), Deptt. of Heavy Industry, Automotive Research Association of India are devising design and manufacturing standards of EVs ,Electric Vehicle Supply Equipment(EVSEs) & charging infrastructure to smoothen the advent of in-house production of EVs.

EVSE: Electric vehicles, including plug-in hybrid electric vehicles (PHEVs), receive energy from the electrical grid through Electric Vehicle Supply Equipment (EVSE), more commonly known as EV chargers.

Recently Centre for Study of Science, Technology and Power Sectors (CSTEP) arrived at a figure of 164 feasible e-bus routes in Bengaluru, by studying & analysing factors like constraints of location, size of depots, bus schedules, incentives, policy schemes, etc.

The expected growth of no. of electric powered cars can be expected as follows;-



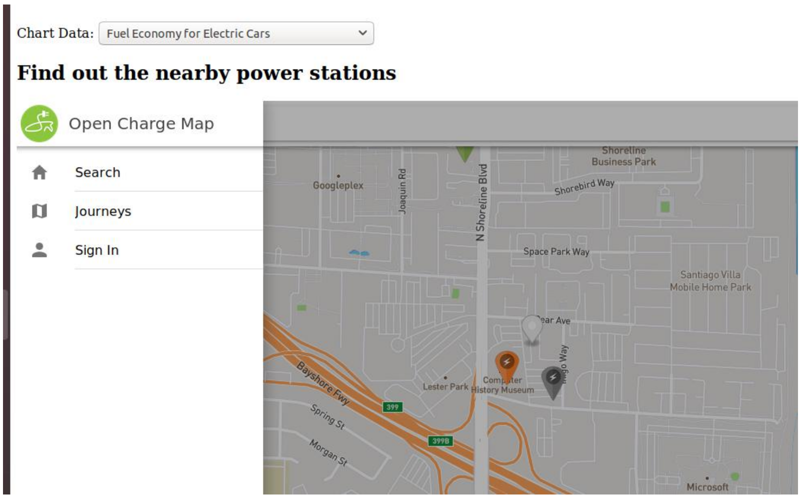
Objective:-

The Government of India is pushing to bring electric vehicles on Indian roads by 2030.There is thus a need for proper infrastructure, such as public charging stations.

Our Vision

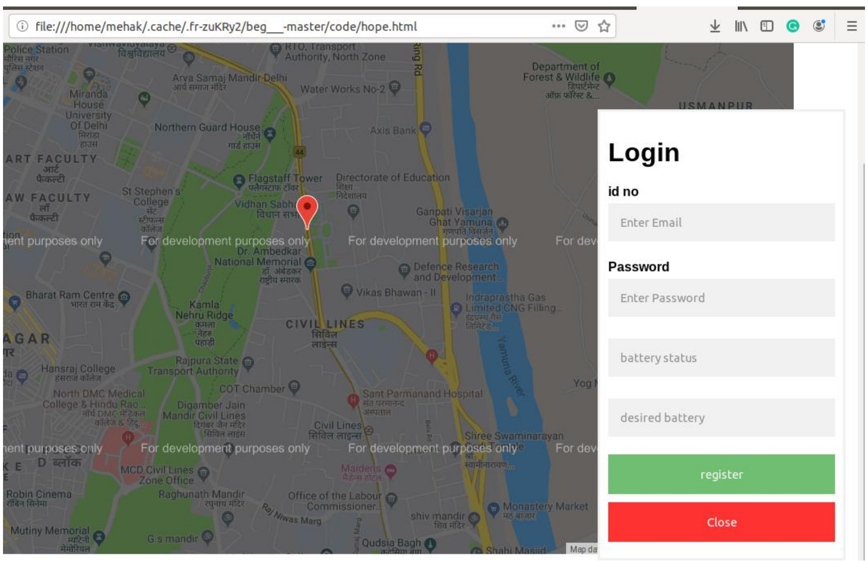
A solution for electric vehicle users to reach the nearest charging station. A probable implementation can be via making use of Google Map APIs.

The user can login into our app and register with us, and create a storage of her favourite stations i.e. the companies whose battery charging points we prefer more as compared to other ones, So using machine learning we can predict the routes favourable to the customer in this way, if that is feasible at that particular instant.



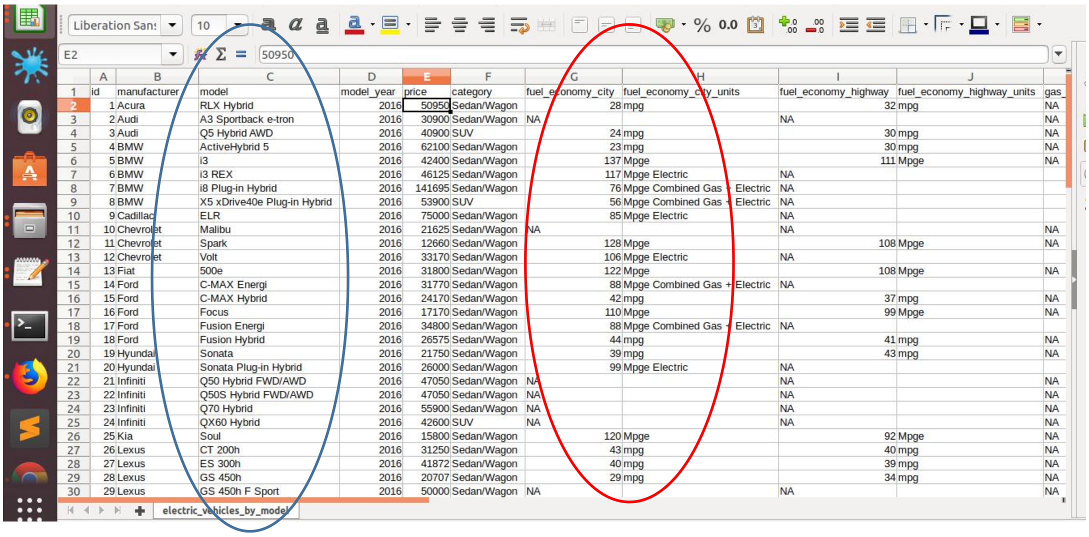
We are going to create an interface to assist the electric vehicle users.
The key points are as follows:

1. Providing information of the nearby charging stations
2. Based on the current battery level of the vehicle, and the threshold amount of battery which we want to have in our vehicle, we can calculate out whether we need to re-fill our battery level or not, before reaching our destination, and if yes then we will also display the location at which they can recharge their battery to the optimum level to accomplish their journey, without any failure.



Let us assume, our current battery level is 65% and we wish to recharge it, when it's battery level falls below 15%
Taking the efficiency(mileage)i.e. Fuel economy is x km/energy unit, we can mathematically calculate the distance range in which we need to locate a charging point, for the battery to get renewed.

Using web-scraping tools of python i.e. beautiful soup, selenium and cherry JS we derived the data from various web online web portals, which is as follows:



id	manufacturer	model	model_year	price	category	fuel_economy_city	fuel_economy_city_units	fuel_economy_highway	fuel_economy_highway_units	gas_
1	Acura	RLX Hybrid	2016	50950	Sedan/Wagon	28	mpg	32	mpg	NA
2	Audi	A3 Sportback e-tron	2016	30900	Sedan/Wagon	NA		NA		NA
3	Audi	Q5 Hybrid AWD	2016	40900	SUV	24	mpg	30	mpg	NA
4	BMW	ActiveHybrid 5	2016	62100	Sedan/Wagon	23	mpg	30	mpg	NA
5	BMW	i3	2016	42400	Sedan/Wagon	137	Mpge	111	Mpge	NA
6	BMW	i3 REX	2016	46125	Sedan/Wagon	117	Mpge Electric	NA		
7	BMW	i8 Plug-in Hybrid	2016	141695	Sedan/Wagon	76	Mpge Combined Gas + Electric	NA		
8	BMW	X5 xDrive40e Plug-in Hybrid	2016	53900	SUV	56	Mpge Combined Gas + Electric	NA		
9	Cadillac	ELR	2016	75000	Sedan/Wagon	85	Mpge Electric	NA		
10	Chevrolet	Malibu	2016	21625	Sedan/Wagon	NA		NA		NA
11	Chevrolet	Spark	2016	12660	Sedan/Wagon	128	Mpge	108	Mpge	NA
12	Chevrolet	Volt	2016	33170	Sedan/Wagon	106	Mpge Electric	NA		
13	Fiat	500e	2016	31800	Sedan/Wagon	122	Mpge	108	Mpge	NA
14	Ford	C-MAX Energi	2016	31770	Sedan/Wagon	88	Mpge Combined Gas + Electric	NA		
15	Ford	C-MAX Hybrid	2016	24170	Sedan/Wagon	42	mpg	37	mpg	NA
16	Ford	Focus	2016	17170	Sedan/Wagon	110	Mpge	99	Mpge	NA
17	Ford	Fusion Energi	2016	34800	Sedan/Wagon	88	Mpge Combined Gas + Electric	NA		
18	Ford	Fusion Hybrid	2016	26575	Sedan/Wagon	44	mpg	41	mpg	NA
19	Hyundai	Sonata	2016	21750	Sedan/Wagon	39	mpg	43	mpg	NA
20	Hyundai	Sonata Plug-in Hybrid	2016	26000	Sedan/Wagon	99	Mpge Electric	NA		
21	Infiniti	Q50 Hybrid FWD/AWD	2016	47050	Sedan/Wagon	NA		NA		NA
22	Infiniti	Q50S Hybrid FWD/AWD	2016	47050	Sedan/Wagon	NA		NA		NA
23	Infiniti	Q70 Hybrid	2016	55900	Sedan/Wagon	NA		NA		NA
24	Infiniti	QX60 Hybrid	2016	42600	SUV	NA		NA		NA
25	Kia	Soul	2016	15800	Sedan/Wagon	120	Mpge	92	Mpge	NA
26	Lexus	CT 200h	2016	31250	Sedan/Wagon	43	mpg	40	mpg	NA
27	Lexus	ES 300h	2016	41872	Sedan/Wagon	40	mpg	39	mpg	NA
28	Lexus	GS 450h	2016	20707	Sedan/Wagon	29	mpg	34	mpg	NA
29	Lexus	GS 450h F Sport	2016	50000	Sedan/Wagon	NA		NA		NA

Moreover we have also scraped data regarding fuel-efficiencies of different electric-powered cars due to which we can provide the user with a custom optimized solutions based on it's car models and preferred route towards it's journey.

After feeding these data in our machine learning supervised algorithms, we can create a database linking the various stations at which people frequently visit and setup a battery-refill station over there, which can be used by varied number of people and will also provide high profit to the station establishing companies.

Using the GOOGLE API for Maps, we can feed the information collected by the user and show them the desired optimized paths accordingly, as calculated by our machines, It's prototype can be represented as follows:

We are aiming to create an android app in react-native hooks, along with kotlin inputs, to create a deployable android-app for the people to use for their necessity.

Moreover, the front-end of our web app will be designed via HTML,CSS,JavaScript, ReactJS, and it will be integrated to the back-end services via NodeJS, ExpressJS. Also for web-scraping part, we will be using frameworks like python's beautiful soup, and cherryjs, to get data from various web-sites and Government Services.

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Manufacturer-reported numbers, as posted on www.hybridcars.com/market-dashboard.html (Accessed 01/27/2016)