Automated Programming Scheme for Efficient Charging with Enhanced Booking Procedure

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Abstract

The rapid growth of the Electric vehicles leads to the essential prerequisite for a magnanimous number of recharging stations in the short radius. Unfortunately, there is no sufficient number of recharging stations in India, so it results in the vehicle traffic in the station. In order to expand the structure of current setup of charging, we have come with a solution by establishing a web application with the help of PHP language as a frontend and SQL as a backend, based on the projected battery parameters the charging slots can be assigned. By implementing the data communication with the recharging station, the information about the availability of port can be retrieved. The app displays the number of ports which is available and it automatically books the available port but if the port is not available it shows the port which will be available within 30 minutes and wait for the user command to book the port or search for another charging station. The paper presents an automated programming scheme for efficient booking of electric vehicles.

1. Introduction

All petrol and diesel vehicles produce substantial Life cycle emissions and Direct emission. Smog-forming chemicals (like Nitrogen Oxides), other chemicals which cause injurious to human health, and greenhouse gases (GHGs), essentially CO_2 are comes under Direct emissions.

An Electrical Vehicle has a lot fewer moving parts than the conventional petrol or diesel car. There are comparatively slight repairing and no luxurious components or various parts like exhaust and fuel feeding systems, motor for starter are not required for EV. With just one moving part – the rotor EVs are particularly simple and very strong. Just maintain the tires, suspension and brakes and that’s about it. Batteries do drain so spare batteries will sooner or later be required. Most car manufactures warrant EV batteries for around 8 years.

Hybrid electric vehicles (HEVs), which have a gas motor notwithstanding an electric engine, produce evaporative discharges from the fuel framework just as tailpipe outflows while working on gas. However, most HEVs are more effective than comparable traditional vehicles, they actually produce fewer emanations in any event, while depending on petroleum.

Thus, the world is moving to Electric vehicles at a very fast pace. Peak rise in the cost of petroleum products also leads to electrical vehicles. Now a days people almost attracted towards the ideal models like Electric Vehicles (EVs) , because the EVs can add to streamline traffic stream and it likewise improve the safety of an environment.

Since there is a limit reliance on petroleum products due to its possible extinction in the near future and also reduces carbon emission in urban areas, the EV will be in widespread use.

In any case, there are a few boundaries towards broad appropriation of EVs. To have huge development of EVs in metropolitan regions, sufficient number of charging offices in metropolitan territories is required but this may cause a lot of trouble like charging the vehicles by waiting for hours and hours, an effective brilliant EV charging the board is needed for overseeing and distributing charging station assetsusing mobile application and website. All-electric vehicles produce zero emanations, which unequivocally assists with further developing environment in metropolitan regions. In contrast to old-style vehicles, EVs don't need such significant expenses, upkeep and besides, they enjoy incredible potential benefits, for example, travel range, accommodation, cost and charging framework.

2. Electric Vehicle

Battery Electric Vehicle (BEV) – A BEV, uses no less than one electric motor or traction motor for drive. A BEV may be controlled through a finder structure by power from off-vehicle sources or may act normally contained with an electric generator, battery or solar based arranged board to change light over to control. BEVs incorporate, however are not restricted to, electric space apparatus, electric specialties, surface and submerged vessel, road and rail vehicles (see Figure 1).

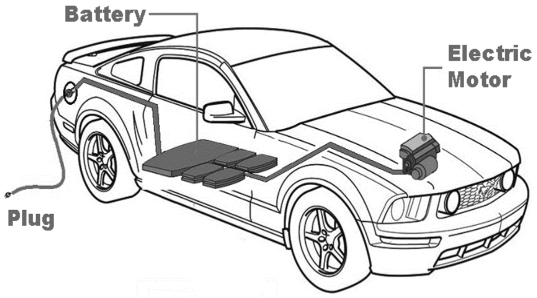

Figure1. Battery Electric Vehicle

EVs initially appeared in the 1832's,at the point when force was center the upheld techniques for motor vehicle push, giving a level of comfort and effortlessness of movement that couldn't be refined by the oil and diesel vehicles of the time. Existing IC motor has been the main drive technique for fuel vehicle for a very long time, anyway electric power has remained conventional in other vehicle types, similar to trains and more humble vehicles, in light of everything.

In the last part of the 90's BEVs saw a resurgence because of mechanical turns of events, and an expanded spotlight on sustainable power. A vast arrangement of interest for electric vehicles created and a little center of architects started sharing specialized subtleties for doing battery electric vehicle show. Government sponsorship to expand receptions were presented, remembering for the United States and the European Union. Electric vehicles are expected to ascend from 2% of the world-wide share in 2016 to 22% in 2030.

Hybrid Electric Vehicle (HEV) - A HEV is mix of ordinary conventional inner ignition motor (ICE) with an electric impetus framework crossover vehicle drive train. The presence of the electric force train is planned to accomplish preferable eco-friendliness over petrol or diesel vehicle and better performance. There are various types of Hybrid Electrical Vehicle and how much each function as an EV likewise shifts. Despite the fact that half and half electric trucks (pickups and farm haulers) and transports exists, the most well-known type of Hybrid electrical vehicle (HEV) is the mixture electric vehicle.

The existing method depends upon smart communication between charging ports and power-driven vehicles. Each charging point fills in as a functional focus (worker) and has specific span of correspondence distance. Along these lines, each station makes a zone of effect on electro mobiles. When power-driven vehicle drives into a region, charging point inevitably detects a vehicle's location and battery percentage. If battery percentage seems to be less than the normal level, then to proceed the recharge, the system shows instinctive notice with suggestion. It implies that vehicle gets a note in the interface with the accompanying data:

- Level of the Battery
- Reserving the Range.
- On a map guiding Point-to-point.
- New recharge proposal.

3. Literature review

Driver can acknowledge or excuse warning. If there should be an occurrence of driver's positive reply, framework naturally appoints season of re-energize as per accessibility of charging attachment and term as indicated by momentum battery level and charging power. Hence, driver knows precisely when the individual in question should show up to the charging point. There is no important to stand by at a line and driver can invest his holding up energy as per his/her inclinations or interests. It is a booking of charging with 'one touch' on the screen (see Figure 2).

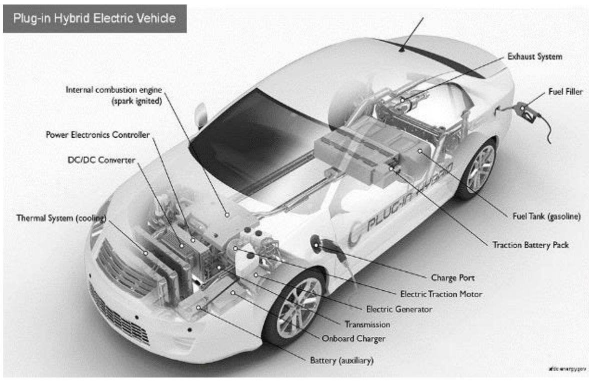

Figure 2. Concept of Service

The main title (on the first page) should begin 1-3/8 inches (3.49 cm) from the top edge of the page, centered, and in Times 14-point, boldface type. Capitalize the first letter of nouns, pronouns, verbs, adjectives, and adverbs; do not capitalize articles, coordinate conjunctions, or prepositions (unless the title begins with such a word). Leave two 12-point blank lines after the title.

Disadvantages of existing system

- The paper explains about sending the notification from the charging station to the vehicle which is limited only to a certain radius zone.

- If the vehicle is not within the range of the charging station, then the charging station could not send any notifications to it.
- The interface in the electric vehicle does not display the nearest charging station.

These disadvantages can be overcome by our work i.e. two-way communication between charging station and the electric vehicle.

4. Proposed system

When we turn on the ignition key, the engine starts and the interface present in the electric vehicle display all nearby charging station. It calculates the distance that can be covered with the remaining battery charge and display it. Possibilities:

- If only one charging station is present within the calculated distance, then it automatically contacts the charging station and check the availability of the port in the charging station if port is available, it reserves the port and if the port is unavailable the vehicle waits for some period of time until the port is available the interface displays the port number and the aerial map to reach the station.

If more than one charging station are present within the particular distance, then it shows the traffic in the charging station which give the convenience to the user for choosing the charging station. Then the above process is repeated.

5. General Flowchart of Charging Procedure of Electric Vehicles

The general workflow of charging procedure of electric vehicles is presented in Figure 3.

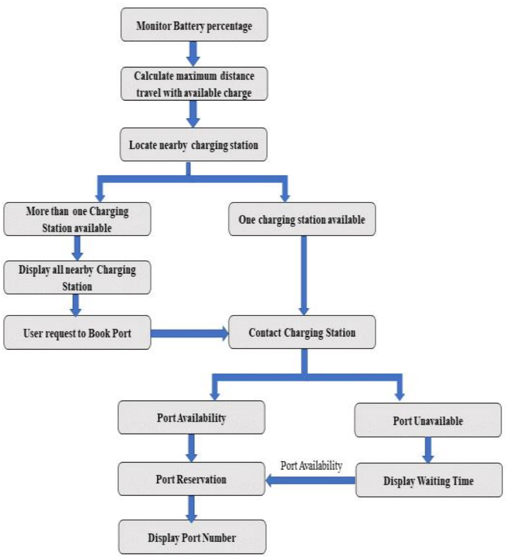

Figure 3. Charging Procedure of Electric Vehicles

The technology makes the user to feel comfortable for reserving the charging station without any manual work so it is user friendly. Since it reduces the searching time for charging station it saves our precious time. It helps the system to avoid battery drain in the middle of the journey and provides many charging stations so that user can book the port according to their convenient. We can also know the exact location of the charging station through the aerial map. Th system is fully automated as well as manual booking for user convenient.

6. Programmed booking for EV charging

The electric vehicle consumer wants to take the slot of the nearest charging unit slot to utilize. The booking and allocation of charging station slots highly defend the available task and expected task completion process (see Figure 4). The main objective of this charging process is the optimal time plans among the existing fixed task and expected booking tasks [16].

Pseudo code for booking tasks scheduling

For $\forall r \in$ cycle **Do**

$S_r = 0$ and $Avg_r = 0$

Call Optimal plan with $T_{fix} + T_{exp}$

For $\forall \eta \in H$ do

Keep T_{fix} unaffected and call Optimal plan for $T_{exp}(n_i)$.

$S_r = S_r$ + All sum $(\lambda * T_{exp})$ { completed tasks addition with each i^{th} value of n in Sr.}

End For

$Avg_r = S_r/|H|$.

End For

Return plan schedule for $T_{f\ ix}$ and being $Avg_r = \text{argmax}(Avg_r)3$

Figure 4. Pseudo Procedure for Booking and Scheduling

This can be attained through the following two steps:

Step 1: count of expected tasks to be an estimate and optimal plan schedules for all available fixed and expected tasks

Step 2: execution time of fixed tasks is pruned estimation (T_f=H*T_s). The tasks related to expected tasks are to be iterative samples execution (T_{exp}). The classical EV charging reservation follows the random charging process without any sequences operation such as much parallel port has activated for charging with usual reservation delay. The programmed charging slot booking, and implementation convenience are illustrated in Figure 5 will help the optimal sequential slot booking with nearest charging station for best of delay less charging slot book for EV demand curve.

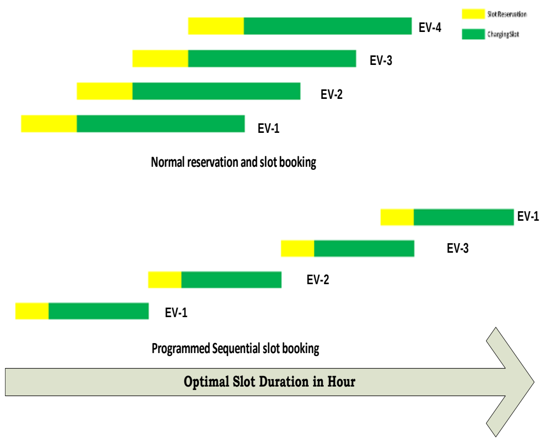

Figure 5. Programmed Sequential Slot Booking using Tasks Scheduling Algorithm

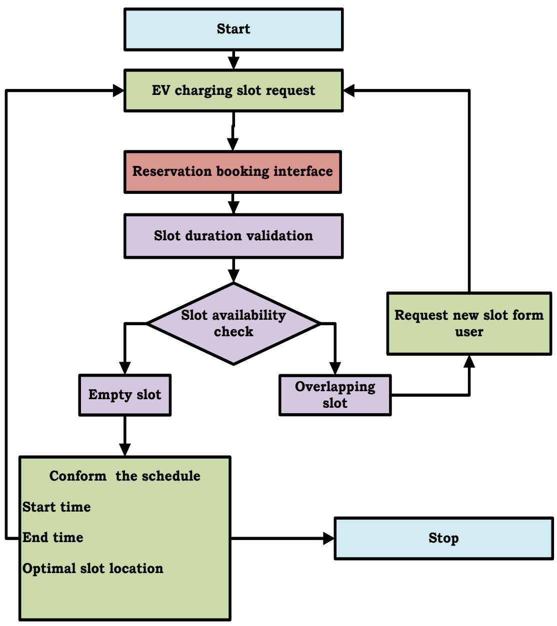

Figure 6. Optimal EV Charging Slot Booking and Confirmation Process Flowchart

The optimal EV charging slot booking process has illustrated in Figure 6. Based on user requirements slots are verified in available EV charging points. While booking the slot the programming interference has been verified the slot duration requirements based on real optimal location of vehicle's Geo-coordinates.

It is important to note that the optimal charging station and allotted time slot were communicated to the EV owner over by GSM channel. The complete booking process interference was displayed in the flowing Figures 7 to 11.

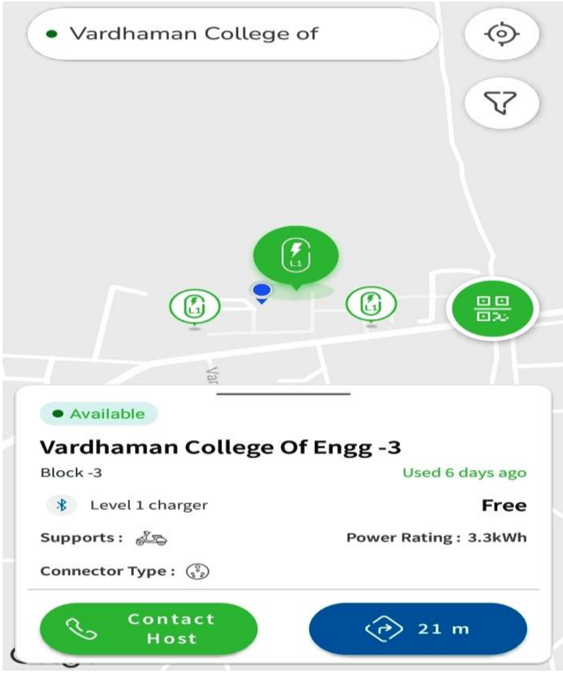

Figure 7. Searching Interference for EV Charging Station

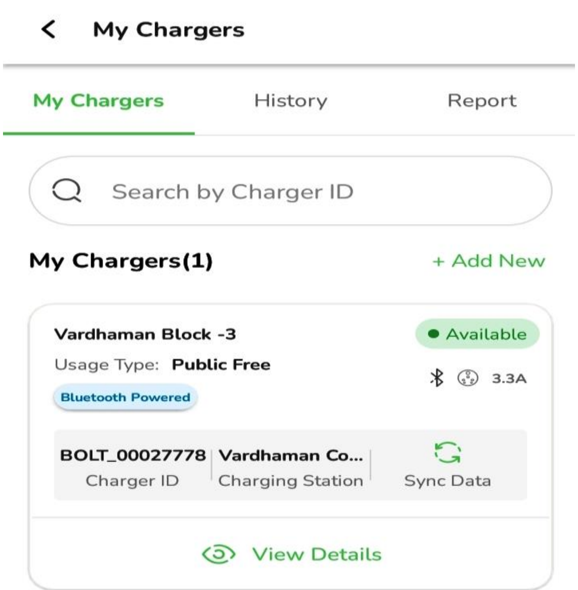

Figure 8. Identification of the Optimal Charging Point

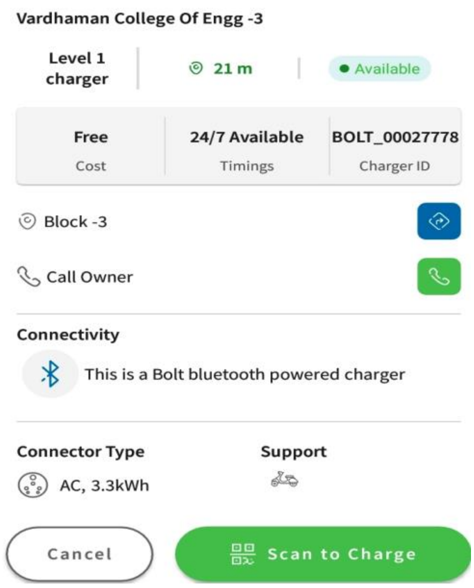

Figure 9. Fixation of Charging Schedule

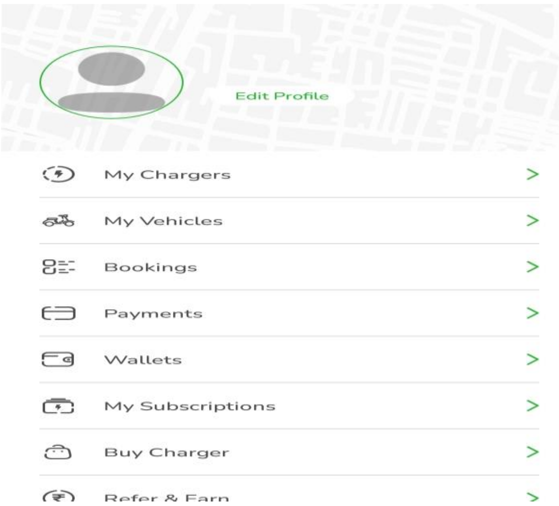

Figure 10. Client Interference Page

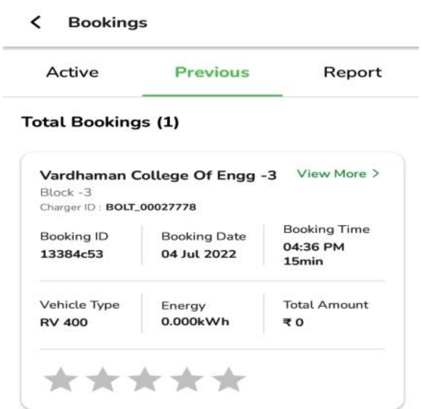

Figure 11. EV Charging Station Interference Page

7. Conclusion

To have critical development of EVs in metropolitan regions, satisfactory number of charging offices in metropolitan regions are required. This may cause a lot of trouble in charging the vehicles by waiting for hours and hours. Thus, a productive keen EV charging station is accomplished for overseeing and dispensing charging station assets utilizing association between the Electric Vehicle and charging station. To have critical development of EVs in metropolitan regions, sufficient number of charging offices in metropolitan territories are required. A proficient savvy EV charging the board is accomplished for overseeing and distributing charging station assets.

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