Solar And Dynamic Wireless Charging System for Electric Vehicle

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Abstract: -. Electric vehicles developed the technology based of the reduced charge time how to increase the efficiency and the range of the system here the base of this technology develop the many countries their electrical cars such as tesla and tata xenon EV max which are available in the market .The demand of electrical cars increase day by day because it reduce the co2 emissions, soundless system provide which is benefits for the environment .first the vehicle charge by the chargers the different type of the charger are used such as ac charger , ac fast charger and dc fast charger but is consumed more time to charge the battery .The develop the new technology that is without charger the charge the system when the vehicles is motion by used the two types of the assembly is first one is the ground assembly which is place to the road and second one is vehicle assembly which is placed inside the electrical cars used of this system we able to do charging while ca are the motions .the physical connection are not used in the system used the different types of the methods such as inductive, capacitive or resonant inductive methods.

Key Words: — ***Electric vehicle basic, topology, modelling, simulation and result.***

I. INTRODUCTION

The number of electrical vehicles is today increasing. Electric vehicles have proved usefulness in lowering travel costs by electricity, which is meaningly less expensive than fuel, it has the benefits to environmental advantages. That why we create the without connectivity system used to charge the for Electrical vehicle The charging station structure that offers a wide range of the system and give the Ah capacity of the battery of the electrical vehicle. This setup remains providing the charge of electrical vehicles.

One of the big issues of CO2 emissions and the change of global climate change due to the fuel-based transportation industry which is using the fossil fuels and to run the electric vehicle in the good and provide wide range.

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The electric vehicle (EV) industry is used to reduction of the co2 emission and stop the climate change which is useful toward the environment. This structure of the without connectivity charging station is charging pads and also coilin transmitting side. Which strong connections could be quite risky, bad weather condition. Additionally, they run the risk arises of sparking while plugging input and output condition, which limits the use of EVs in several situations [1].

Emission-free green transportation options, such as walking, bicycling, conventional public transportation, and train systems, etc. Vehicle types include solar energy vehicles, hydrogen-powered vehicles, electric vehicles, natural gas vehicles, and hybrid energy vehicles [3]. This hybrid system uses a variety of electrical power sources, including batteries or super capacitors for energy storage, as well as renewable energy bases such solar Photovoltaic system [4].

more effective and efficient also. We have implemented a system that ranks the top employee based on work feedback policy as well as suggestions. This system will focus not only in qualification and in experience but also focuses on other important aspects, which are required for a particular job position. This system will help the human resource department to select the right candidate for a particular job profile, which in turn provides an expert workforce for the organization. For all this process we use Artificial Intelligence (AI). It refers to technology used to do a task that requires some level of intelligence to accomplish. AI technologies offer significant opportunities to improve HR functions to Finding the right information, with lower costs, in less time and in a secure manner helps to build momentum step by step, beginning with the recruitment process.

II. Electric Vehicle Basic Technology

Solar and dynamic without connectivity station structure is the technology where the rechargeable vehicle charging while driving and also static. The use of these system is reduced the cost of the electronic automobile and increase the range of the EV and reduced the limitation of the battery, increase the fast-charging system. In compare to plug in system the solar and active wireless incriminating structure better is compare electrical vehicle. The solar and active without connectivity charge system are design basically four types of the electrical automobile without connectivity of the system are first is inductive, capacitive, magnetic gear, resonant inductive are he example of the without connectivity station system tuner power system, these technologies are used to charge the battery [5].

Solar and dynamic without connectivity structure are used to control the system while moving the transmitter pad contains by transmitter track in the road side. The Electric vehicle are receiving side the receiver pad used in vehicle assembly. Used compensation elements network and power modulator.

Several countries aim to zero emission before 2050 .in year 2020 renewable energy -based power generation increased 3%. A dynamic wireless charging system upgraded to green transportation by integrating renewable energy resources. A demand side management algorithm proposed to decrease the carbon footprint generated by road transportation the energy storage system and solar system integrated with dynamic system and the optimized algorithm develop the smooth maintain of system

Types of Wireless charging used to charge the battery of electric vehicle

- Inductive wireless power transfer method
- Capacitive wireless power transfer method
- Magnetic gear inductive wireless power transfer method
- Resonant inductive wireless power transfer method

Table.1. Advantage and Feature of Compensation Network

features	Series-Series (SS)	Series Parallel (SP)	Parallel Series (PS)	Parallel Parallel (PP)
Power transfer capability	High	High	Low	Low
Sensitivity of power factor over distance	Less	Less	Moderate	Moderate
Alignment tolerance	High	High	Moderate	Low
Impedance at resonant state	Low	Low	High	High
Frequency tolerance on efficiency	Low	High	Low	High

Electric Vehicle batteries are used to store electrical energy. A battery converts chemical energy to electrical energy. Some parameters of Battery are Charging rate, Charging Current, Charging time, Backup, battery capacity AH, no of life cycle of battery and other characteristic of batteries. the different types of batteries are used in electric vehicle like Nickel cadmium, Nickel metal hydride, lithium ion.

Nickel cadmium: Nickel cadmium batteries specific energy higher than a lead acid battery but smaller than Li-ion battery. this battery can tolerate deep discharge compare to toother type batteries and is also used in under rough condition. NiCad battery have high life cycle and these batteries have charging problem at high temperatures. While Ni Cad batteries use cadmium which is a toxic heavy metal.

Lithium-ion batteries: Li-ion batteries have high specific energy and high energy density compared with the other type of batteries. These batteries have high cell voltage, good life span and low self-discharge rate. They have fast charging ability as compared with the other battery types. Li-ion battery provides a reasonably constant cell voltage Lithium-ion batteries the load characteristics are good

Electric Vehicle used different types of motors based which modal of electric vehicle. different type of motors like direct current motors, Induction motors, permanent magnet synchronous motor, Permanent magnet brushless dc or ac motors.

Permanent Magnet Synchronous (PMS) Motors

In synchronous motors, rotor pivots at synchronous speed, the rotor is energized from a DC supply and stator is associated with a 3-phase AC supply. The most effective motor is the Permanent Magnet (PM) Brushless Motor drive because PMS motors are also known as brushless AC motors. These motors take in a few points of interest vis higher power thickness.

Permanent Magnet Brushless DC and AC Motors

These are accessed by for all intents and purposes transforming the stator and the rotor of the permanent magnet of the dc motors. The BLDC motors are fed by an AC supply that is rectangular in nature as opposed to a sinusoidal supply. Benefits of BLDC motors is their capacity to deliver a great torque other motors are simple apex of amount of current and voltage .and these gives a powerful power thickness and a substantially more noteworthy productivity, permanent SRMs utilize rotor position switches to separate the phase windings in sequence. Wide speed extended is conceivable. Rotor aims to proceed toa place of slightest reluctance in this way inducing torque.

III. MATHEMATICAL MODEL

3.1 Charging Station Load Profile Modelling

3.1.1 SDWCS Model

A simplified single-coil SDWCS structure where the road-side unit usually consist of a grid interface conveter,a full bridge inveter,a resonant network and transmitter coil,and the on-board units includes a reciver coil,a resonant network ,rectifierand dc -dc converters .

According to kirchhoff's circuit law the voltages ad currents in the circuit can be expressed as

$$v_{in} = j\omega L_{11} \times i_1 + \frac{1}{j\omega C_{11}} \times (i_{in} - i_p) \quad (1)$$

$$v_p = \left(\frac{1}{j\omega C_{12}} + j\omega L_p\right) \times i_p - j\omega M \times i_s \quad (2)$$

$$j\omega M \times i_p = \left(j\omega L_s + \frac{1}{j\omega C_s}\right) \times i_s + R_o \times i_s \quad (3)$$

Where $R_0 = 8v_0/i_0 d^2\pi^2$ is the equivalent resistive load in secondary . the buck conveter in th on board unit and its duty cycle denoted by d.

The resonant rates on the main subordinate sideways are identical,which can be calculated by

$$\omega = \frac{1}{\sqrt{L_s C_s}} = \frac{1}{\sqrt{L_{11} C_{11}}} = \sqrt{\frac{C_{11} - C_{12}}{L_p C_{11} C_{12}}} \quad (4)$$

Combining (1),(2),(3)and (4),SDWCS is output power can be calculated as

$$p_{out}(t) = |i_s|^2 R_0 = \frac{M(t)^2 v_{in}^2}{R_0 L_p} \quad (5)$$

The relationship among the dc-bus voltage v_{dc},the phase shift angle θ, the full-bridge invertershow harmonic output voltage so Vin can be expressed as

$$V_{in} = \frac{4v_{dc}}{\sqrt{2\pi}} \times \sin\left(\frac{\theta}{2}\right) \quad (6)$$

Substituting (6)into(5),the output power can be expressesd as

$$p_{out} = \frac{M(t)^2 v_{dc}^2 sin^2(\frac{\theta}{2}) i_o d^2}{L_P v_o} \quad (7)$$

In the above equation,that dc-bus voltage$v_{dc}$is usually regulated as a constant by the grid interface converter,the battery voltage $v_o$and current i_o are set by on-board battery unit.Thus the output power of SDWCS p_{out} is determined by mutual inductance M.

the proposed system, we have implemented an organization-oriented system that would assist the human resource department in short listing the right candidate for a specific profile. The system could be used in many business sectors that will require expert candidates, thus reducing the workload of the human resource department.

IV. Electric Vehicle Simulation and Result

4.1 Calculation of Parameter

Solar Dynamic Wireless Charging system: The Solar and Dynamic wireless charging system in this calculation we calculate the charging battery current, charging battery time for 400 AH battery using solar and dynamic wireless charging system and also compare the result electric vehicle modal is TATA Nexon EV Max.

4.1.1 Charging current of battery

T=AH/A Time T=hours, Capacity AH=Ampere hours, Current A=Ampere

Let take the battery is 400AH a and Charging current is at least 10%of AH capacity of battery

$400\times(10/100)$=40A

Due to losses add 10%of charging current so total charging current is 40+1=41A

4.1.2 Charging time of a battery

Charging current =41A, Battery capacity =400AH

T=AH/A then T=400/41 =9.45-minute hours

This is ideal Case that why we increase the battery capacity 40% Then 400Ah×(40/100) =160AH

Total AH=400+160=560AH

Battery charging time =Total Ah /Charging Current = 560AH/41A =13.39 minute-hours

4.1.3 Battery Backup (Battery discharging)

Battery capacity AH ×Voltage×No of Battery ×Power Factor

400AH×12V× 1 ×0.8 =3840

For ex: Equipment =Watt×no of equipment

Fan=65× 2=130W, Charging pads=40× 2=80W, Cell=100× $1 = 100w$

Total load=310Watt

Backup = Total Watt/Total Load =3840/310 =12.22 min hour backup

Constant voltage (CV) of battery 13.8V as per BMS Inverter

Temperature of battery

Depend on temperature <15℃

Top of current voltage (TOC) of charger=15.8to16.5V

Benefits of CV

Battery should not over charge during constant voltage charging. Battery final electrolyte final gravity H2SO4 is 12.55to 12.60 this the cut of gravity.

4.1.4 Result

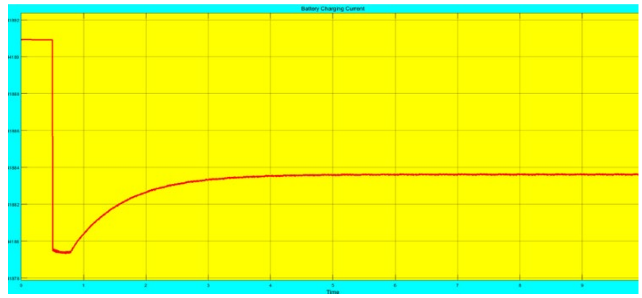

Fig.1. The battery current measurement

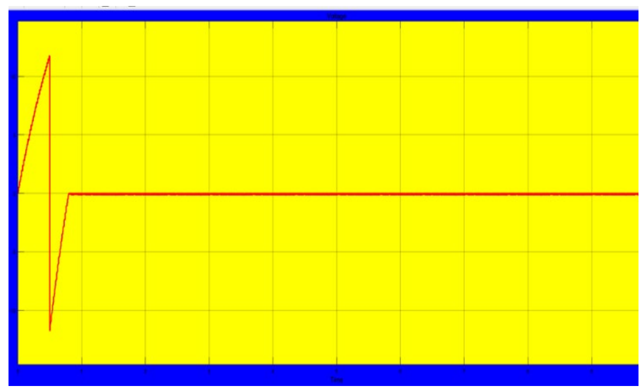

Fig.2. Battery voltage measurement

4.2 Solar Wireless Charging system

Take the load is 300 watts & voltage is 12V

Dc current required= P = V× I, I=300/12, I=25A

Battery size selection in AH

=Total load×Backup time in hours/Battery Voltage

=300× $16/12$ =400 AH

Battery charging time =Battery size AH/charging current is 10% of battery capacity so take as 10

=400/10 =40A

4.2.1 Solar plates current

=Battery charging current + DC current

=40+25 = 65A

For panel Open circuit voltage is 18V to 21V and Closed-Circuit Voltage is 14 to16V

4.2.2 Solar Plates Power

=V×I =14×65=910W

Market available Solar Panel is 125Wis output voltage is 12V, 180W is output voltage is 12V, 375W is output voltage is 24V, 440Wis output voltage is 24 V

No of Solar Plates =Solar panel power/market available solar panel power

=910/180 =5.055 that meas5 solar panel require (180W)

V. Conclusion

This paper presents a depth review of the key topics related to Solar and dynamic wireless charging system for EV charging .it gives an overview of the components used in WPT systems and major research interest and findings within each component. The electric vehicle motors ,electric vehicles batteries, methods of wireless power transfer method for solar and dynamic wireless charging system, Compensation topology are used solar and dynamic wireless charging system and what problem arise in electric vehicle technology solution used of solar and dynamic wireless charging system .in this paper show the MATLAB simulated result of solar and dynamic wireless charging system for electric vehicle calculated battery charging time, battery charging current, battery backup, Battey capacity main focus of this paper how to reduce the charging time of battery and load demand of electricity.

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